THE Chemical Age

VOL. LXXI 4 DECEMBER 1954 No. 1847

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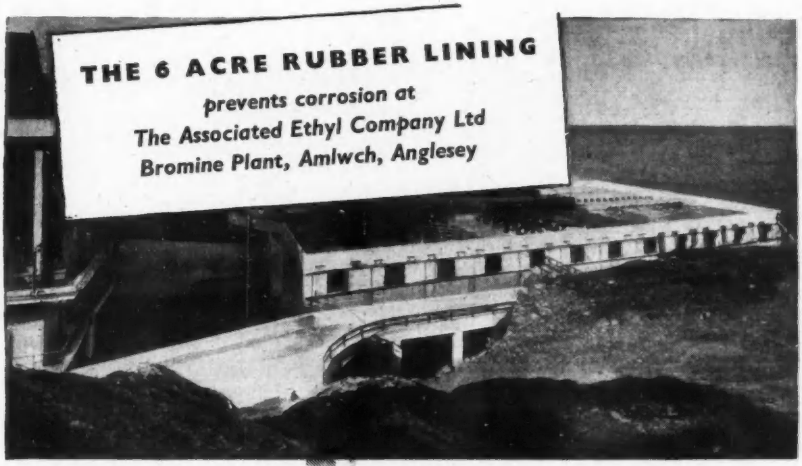

This huge rubber-lining contract completed by the General Rubber Goods Division of the Dunlop Rubber Company represents one of the largest plant-lining assignments ever undertaken. Rubber and rubber-based compounds were the only materials capable of protecting concrete and metal from the constant attack of hydrobromic, sulphuric and other acid mists liberated during the production of bromine... a vital element in the manufacture of "additives" for modern fuels.

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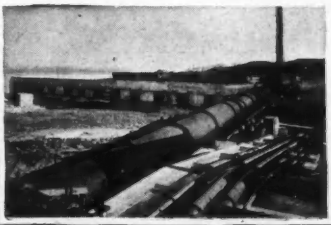

Large-bore pipes such as this sea-water main, storage vessels and ducting throughout the plant are rubber lined, and rubber again covers the huge fan units and 4 miles of steel girders.

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'Teach-How' and 'Know-How'

'ONE can scarcely be in England more than a few days before one runs into the claim, often made by a visiting American, that the English student from age 18 on is at least two years ahead of his American contemporary in preparation. Furthermore, chemistry is one of the fields of study most sought after by the gifted student . . . about 9 per cent of these people (State scholarship holders) are in chemistry. Whence comes this apparently roseate situation? Can we attain a similar one? Imagine that 10 per cent of new high-school graduates, age 18, were able to enter the junior year of the typical American university chemistry curriculum and do work of scholarship calibre!' This extract is taken from an article in the journal, *Chemical Education* (1954, **31**, 581), an article written by Mr. J. A. Campbell of Overlin College, Ohio, following a 10-months' visit here on a travelling fellowship. Such praise from a country of ever advancing technology is unusual indeed. Yet at home few of us are satisfied with the state of British scientific education.

Mr. Campbell's Anglo-US comparisons on this subject deserve the utmost attention. He does not take a morbid view of our teacher-shortage problem. 'In spite of the low salary scale, the competence of the average teacher engaged in university or university preparatory teaching is high.' Comparatively low salaries, building delays, equipment shortages, and the high post-war birth-rate should have made contemporary British educational problems far more serious than those of America; in practice, Mr. Campbell has found that the situation is similar in both countries. The basic facts here are much less favourable, the results are much the same.

However, Mr. Campbell has removed the mystery from this apparently remarkable difference in achievement. Up to the age of 16 the percentage of children receiving full-time education in the two countries is similar; actually Mr. Campbell takes the age of 15 as his dividing point, but here again we think he has made an error of observation. When this age point is reached the educational systems of the two countries become exceedingly dissimilar. Post-16 education here is highly selective; it does not become appreciably selective in the United States until the age of 18, and even after 18 the extent of selectivity is smaller than in Britain at 16. A much larger proportion of the 15 to 22 age group in America still receives full-time education. Consequently the facilities of British education — space, teachers, money, equipment, etc.—are much less strained. We are able to aim in higher education at quality rather than quantity of output. It probably needs the outside judgment of an American investigator to bring out this vital difference in its fullest light, for most of us at home have been supposing that our higher education opportunities have been greatly widened in the past decade. Indeed, they have—but the expansion is only relatively large, large in the British view because before the war this front of opportunity was so much narrower, still small in the American view because there the comparable front has always been so much bigger.

Mr. Campbell has found the level

of education of 18-year-old scholars considerably higher here than in America. 'The university scholarship examinations would be passed successfully by only a small fraction of the entering juniors in a typical American (university or college) chemistry department.' He cites some of the questions from Cambridge examinations—and we might add, perhaps irrelevantly, that at least one of them would daunt most chemists now 10 or more years removed from examination battlefields. The British university-preparatory standard is so high that Mr. Campbell found evidence that able first-year undergraduates had considerable difficulty in avoiding 'going stale' in their first year at the university. In the sixth forms of the schools 'they have already covered a large part of the first year's work.' This verdict from America is in some contrast to views of university teachers here, who have sometimes complained in recent years that incoming students are insufficiently prepared.

In British education the preliminary processes of selectivity begin at 12; in US education they have scarcely started at 15. As is well known, many British parents regard this early sorting-out process as unduly harsh. It has become a theme of bitter social controversy. Yet it is clear from Mr. Campbell's analysis that only the firm application of selectivity has enabled our limited educational resources to produce end products of high standard. It takes the US educational system another two years to reach the same final standard—that is Mr. Campbell's own verdict, and again it is an opinion showing some contrast to others that have been expressed in recent years. Mr. Campbell asks, 'Where are the two lost years of the Americans?' He might have noted that one of them is to be found in the elementary beginning, for his own statistics show that British school education starts when children are five, American when they are six. Here, moreover, the two years that British students have gained are in many cases given to the longest period of compulsory military service operating among Western nations.

The vital question, however, is this: 'If the English system of educating scientists is really better, how does one account for the general ascendancy of American science compared with the rest of the world?' We may perhaps think that he is a little biased in assuming 'general ascendancy.' Nevertheless, making all discounts, we must concede a greater vigour in US technology, a readier skill in utilising scientific potentialities. Mr. Campbell suggests that the answer is to be found in the very point which seems to be the strength of our educational system—'selectivity is not only a strength, but a vicious weakness.' The American system does no better with the really gifted and it takes longer to do it; the results may not indeed be quite as good. But much more is done for the less gifted and 'here are the ones who, though no geniuses, no great discoverers, no pioneers of knowledge, can make things work. They have the common touch; they are practical.' American education produces a much larger proportion of men who are 'trained to a high enough degree to make a large industrial organisation possible' but with our system we are not securing 'the broad base of trained manpower necessary for mass industrialisation and production.'

Whether Mr. Campbell has or has not spotlighted a strength in the US system, we feel sure he has spotlighted the gravest weakness in ours. We are devoting all our best educational facilities to one layer of society. The graduates produced are sought for competitively by industry, teaching, research, the civil service, the forces, etc. Many of these needs could be adequately met by a well trained second or middle layer. That we are conscious of this gap is shown by the pressure for new centres of technological education and also by the fact that 'part-time education is much more common in England than in the United States.' But these remedial efforts are not enough—certainly the progress to expand technological education is disturbingly slow. So far selectivity in British education has been justified by scientific education, can we afford indefinitely to accept this pattern?

Notes & Comments

Check to US Merger Trend?

IN the past two or three years the formation of mergers in the US chemical industry has been setting a pace unequalled since the depression-driven 'thirties. In only two years there have been some 50 'tie-ups' between previously dissociated chemical companies. A number of these mergers have involved companies already large in size. It is scarcely surprising, therefore, to learn (see *Chemical and Engineering News*, 1954, **32**, 4478) that this new boom in economic polymerisation is attracting the attention of the US Federal Trade Commission and the Justice Department. America's anti-trust laws form a particularly sensitive part of her legislation, and the greater freedom of industrial concerns in other countries to form large units has often been sharply attacked by American politicians and industrialists. It might be said that witch-hunting for monopolies is almost as vigorously pursued as it is for communists in state departments.

To Carry Out Survey

THE FTC and the Justice Department will carry out a survey to analyse the causes of the new boom in mergers; other industries besides the chemical industry will be considered. The survey will embarass recent cases of merging only if it can be shown that any of them has violated the anti-trust laws by seeking to lessen competition. Merging companies in order to diversify production, improve raw material supply arrangements, or bring more closely together related processing are not violations of anti-trust laws. These legitimate motives are particularly likely to express themselves in the growth of modern chemical industry, and it seems probable that they will be found to be the only explanation of the recent merger trend. If so, the survey will be a service to the US industry for it will balance any tendency for public opinion to be critical. However, while the survey is being carried out, a slowing-down in the current pace of merger formation is to be expected. Large-unit operation is an economic necessity in many fields of chemical manufacture, not least of all in some of the newer fields. It is difficult to see how a country of America's industrial strength and sense could permit legislative measures that are now quite elderly to discourage genuine movements towards economic efficiency.

H_2SO_4 by 1955/56

THE pattern of British sulphuric acid supply has already changed substantially since 1951 but it will have been transformed by the end of next year or by early 1956. By then, the two new anhydrite plants at Whitehaven and Widnes will be on full production, and the veteran Billingham plant will have nearly doubled output as a result of its extensions. Altogether, we shall have a yearly capacity of 400,000 tons of acid from anhydrite alone. Previously the anhydrite source has produced only a quarter of this amount. In addition to this home-based source of acid, there are, of course, the other home-based sources, spent oxide and smelter gases. With these additional production capacities in the picture, it seems fairly certain that by late 1955 or thereabouts nearly half our acid needs will be being made from internal materials. This is a most commendable effort in a mere four years. At the height of the sulphur scare, we were producing only about 25 per cent of our acid requirements from home sources. There is one small discrepancy in this argument; it could be said that smelter gases are not always 'home sources' of sulphur, for the ores used in the metallurgical plants may well have been imported. However, since they have to be imported for other reasons, we may perhaps regard their waste by-products as indigenous by circumstance if not by factual origin. From the strategic angle, it is a point to be borne in mind, for any inability to secure foreign

ores would reduce that part of our capacity to produce acid from supposedly home-based materials.

Premium not Insignificant

As for the other half of our acid needs, there has been a steady shift away from sulphur towards imported pyrites. The use of sulphur has already dropped by more than 25 per cent; since 1950/51 the use of imported pyrites has more than doubled. The fact that fears of a world sulphur shortage have been dissipated has not so far persuaded the Government to change its policy of sulphur discouragement. Import licences are still limited and there is little sign that control over sulphur will be relinquished. However, the costs of producing acid from sources other than elementary sulphur are higher. A recent article in *The Economist* (1954, **173**, 588) put the cost of acid from anhydrite at £1 a ton more than the cost of acid from imported sulphur, and the cost of acid from pyrites at about £2 more. This suggests that the premium we must pay for rebuilding our acid industry so that it is much less dependent upon a single and foreign raw material is not insignificant—it amounts to a surcharge of 15 to 30 per cent on the price of acid However, this may be an over-gloomy assessment. The relief of the sulphur scarcity has been partly achieved by bringing in higher-cost sulphur domes; even if sulphur shortages do not return, we have no assurance that the price of elementary sulphur will not continue to rise. Also, as the volume of acid production from anhydrite and pyrites rises, there is always the hope that costs can be reduced.

Record Oil Consumption

CONSUMPTION of petroleum products in the UK, especially of fuel oils, continues to rise. Figures which have just been published by the Petroleum Information Bureau on behalf of the UK Petroleum Industry Advisory Committee show that total inland consumption in the first nine months of 1954 was 15,520,917 tons, an increase of 10 per cent over the corresponding period last year.

The greater part of this increase is due to increased fuel and gas oil consumption—in industry, for central heating, for power purposes, including gas-making, and by the UK refineries themselves (which used over 30 per cent more fuel oil). Motor spirit tonnage rose by only 2½ per cent, although on a gallonage basis the increase was 3½ per cent.

Burning oil consumption has also increased, whereas vaporising oil has further declined, due to the increased use of newer tractors running on diesel oil. The general rise in industrial production is reflected in the growth in consumption of lubricants and other petroleum products.

Deliveries of propane and butane increased from 39,650 to 43,554 tons and bitumen from 561,423 to 617,403 tons.

Members of the Council of British Manufacturers of Petroleum Equipment visited the Rochester and Lewisham works of Elliott Brothers (London) Ltd. on 18 November. Our picture shows some of the guests examining exhibits arranged to illustrate recent developments in instrumentation and automatic control techniques

New Metal Corrosion Inhibitor

Howards Now Producing Cyclohexylamine Carbonate

TWO vapour-phase corrosion inhibitors which have attracted considerable attention recently are dicyclohexylamine nitrite, which is available commercially, and cyclohexylamine carbonate (CHC), which has recently been developed by Howards of Ilford Ltd., Ilford, Essex.

CHC is a white solid smelling faintly of ammonia, soluble in water and in alcohols. Tests have shown that CHC volatilises rather more slowly than camphor but more quickly than dicyclohexylamine nitrite. The protective CHC vapour is produced immediately the solid is introduced into a package and it diffuses rapidly throughout the whole of the space. CHC vapour inhibits corrosion even in the presence of water, water vapour or salt water and arrests corrosion of already partially rusted iron and steel.

Extensive laboratory investigations have shown that, while no single known inhibitor will protect all metals and alloys under all conditions, CHC reduces corrosion in most cases and gives almost complete protection to many materials. A high degree of protection is given by CHC vapour to mild steel, cast iron, aluminium, chromium-plated steel, tinplate, zinc, and solder, even when exposed in a water-saturated atmosphere for two weeks at 40° C (see table). Under certain conditions CHC has some corroding action on copper, brass and magnesium.

Vapour More Effective

Solid CHC does exert an inhibiting effect in contact with metal surfaces but tests have shown that in almost all cases the vapour is more effective. Comparisons of CHC-impregnated paper (1 gm. per sq. ft. of paper) with paper similarly impregnated with dicyclohexylamine nitrite have shown CHC to be generally superior, particularly where the inhibitor is a foot or more from the object to be protected. The superiority of CHC is still more marked, it is said, when compared in the vapour phase under the stringent conditions of salt-water-contaminated moist air at 40° C for 18 days.

Where rust has already formed on metal surfaces, and particularly where salt spray has also come into contact with the rusted surface, CHC provides inhibiting action and arrests the progress of the corrosion. This protection can be given by contact with the solid but again the vapour has been shown to provide the best results. Dicyclohexylamine nitrite, on the other hand, has not been found to arrest further rusting, once some corrosion has begun.

The accompanying table shows the losses sustained by various metals after 14 days' exposure at 40° C to a water-vapour-saturated atmosphere. It will be seen that CHC reduces corrosion in most cases and in some cases almost completely prevents it. Copper, copper alloys and magnesium, however, are liable to be attacked by CHC if droplets of water are allowed to condense on the metal, as happened in this case.

Metal	Metal Panels Exposed in Vapour of		
	Controls no inhibitor	Dicyclohexylamine Nitrate	CHC
Ferrous Metals—			
Mild steel	27.5	19.0	0.1
Cast iron	161.3	146.2	1.4
Non-Ferrous Metals—			
Aluminium	3.9	1.8	0.8
Brass (60/49)	1.3	0.5	8.8
Cadmium (massive metal)	10.2	9.5	9.5
Chromium plate on brass	0.4	—	0.4
Chromium plate on steel	4.4	—	0.2
Copper	4.0	2.4	16.7
Magnesium	4.2	5.0	18.9
Solder on brass	1.1	10.0	0.5
Tinplate (hot-dip)	11.3	—	1.2
Tinplate (electrolytic)	16.9	—	0.9
Zinc	21.4	14.5	3.2

Figures given are losses in weight (mg.).

In a series of tests to determine the effect of distance, test pieces of mild steel were suspended at various distances from 5 per cent aqueous solutions of the inhibitors. The results after 6 months' exposure proved that CHC was effective up to a distance of 30 inches. Exposure tests at various distances between the test pieces and sheets of impregnated wrapping paper (1 g. per sq. ft.) showed that the CHC impregnated paper provided almost complete protection up to a distance of 2 inches for mild steel and also incidentally reduced the corrosion of copper in normal humid air containing the usual industrial pollution.

Vapour-phase inhibitors are only recommended for use where vapour loss can be reduced to the lowest practicable propor-

tions by using (and storing) the inhibitor in a closed package and, as has already been noted, laboratory tests indicate that the present inhibitors are not anti-corrosive agents for some non-ferrous metals and alloys under all conditions.

Experience of CHC is at present limited to laboratory scale trials and firm recommendations cannot at this stage be made with certainty. Nevertheless the tests which have been carried out indicate that CHC may prove on further large-scale trials to be a considerable step forward in the field of corrosion prevention. For packing cases or for the insides of metal vessels, pellets, impregnated porous blocks or powder in porous bags appear to be convenient ways of introducing CHC. The loss of CHC during storage life will be mainly determined by the rate of vapour leakage and therefore a reasonably strong and air-tight package would be desirable. Packages such as steel drums and other air-tight metal containers lend themselves admirably to the vapour-phase inhibitor technique. Protection of the insides of empty boilers and storage tanks is practicable by these methods.

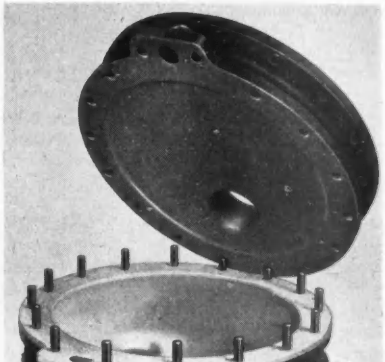
Extended trials are being carried out by the Ministry of Supply and the Printing Packaging and Allied Trades Research Association. In addition to these tests, there would be real advantage in accumulating experience under actual service conditions, and engineering firms and others who wish to carry out their own investigations into the merits of CHC as a corrosion inhibitor may obtain trial quantities of the compound for this purpose from the sole manufacturers, Howards of Ilford Ltd., Ilford, Essex.

Sectional Condensers

THE new pattern condenser recently introduced by Cannon (CP) Limited is built up of interchangeable sections with domed top and bottom covers. No separate water jacket is necessary as water passages are formed in the castings.

The interchangeable sections can be readily removed or added to if a change in process necessitates an increase or reduction in the cooling surface area. Reports from users of installation plant embodying this new pattern condenser indicate that it is considerably more efficient than the earlier patterns.

The sections are made of cast iron lined



with hard grey acid-resisting enamel and are available in 12 in. and 18 in. diameters. The 12 in. diameter condenser gives a cooling surface area of 1¾ sq. ft. per section and the 18 in. diameter section a cooling surface of 3½ sq. ft. Where large cooling area capacities are required, two sets of condenser sections can be mounted in parallel connected by T pipes. The domed top and bottom covers of the condensers are provided with 2 in. bore branches for vapour inlet and outlet and tapped 1 in. connections for water inlet and outlet.

N.Z. Heavy Water Plant

There are indications that sufficient geothermal steam has already been proved for an initial heavy water plant and an associated 40,000 kilowatt electric power generating plant at Wairakei, New Zealand, according to Dr. H. R. C. Pratt, a member of the United Kingdom Atomic Energy Authority and leader of a visiting British designing team. Actual construction, he added, will probably begin within a year. Britain is financing the first plant and New Zealand the second, and both are expected to come into production about the same time in 1958.

French Chemical Research*

At the Direction des Etudes et Recherches du Gaz

WHEN the French gas industry was nationalised in 1946 the chemical department of the Direction des Etudes et Recherches du Gaz de France was formed from the staff of the chemical laboratories of Gaz de Paris. These laboratories are still in use, but are now much too small owing to the gradual recruitment of young workers.

This overcrowding combined with the inadequacy of existing equipment resulted in plans for the establishment of a vast new research centre, which will occupy an area of 10 acres on a site a few miles north of Paris. The laboratory is expected to be ready for occupation by the spring of 1955, which should therefore see the end of the physical difficulties that have so far been a serious obstacle to the work of the DERG.

At present, the chemical department has a staff of 125 people, to which must be added some eminent university professors who undertake research in their own laboratories, or take charge of research teams at DERG. This arrangement has proved extremely flexible and most effective, and it is intended to continue in the same way, even after the younger workers have gained sufficient experience to be able to take charge of research projects. The reason for this is that the universities do not approach research problems from the same angle as professional engineers, and considerable benefit can be derived from the resultant exchanges of views.

The equipment of the laboratories has no special features. Policy in this matter has always been to avoid buying expensive equipment requiring delicate handling, except when it was required for continuous use and the necessary skilled personnel were available. For example, there is a set of infrared spectrometers, which have already given a lot of help. An ultraviolet spectrometer may possibly be acquired but for the moment there is no intention of installing either X-ray apparatus or an electron microscope. In exactly the same way as the DERG has not hesitated to appeal to leading scientists for outside assistance, it has always asked specialised laboratories, such as the Laboratoire des Services Chimiques de l'Etat, to undertake any X-ray analyses, surface measurements, etc., and assistance has been given on biological subjects by the Institut Pasteur, at Garches (near Paris), and the Centre National de la Recherche Scientifique (Marseille Laboratories).

* From a paper read before the 20th Autumn Research Meeting of the Institution of Gas Engineers in London on 22 November by P. C. Agron, assistant manager of DERG. (Publication No. 455).

Left to right: M. P. C. Agron (speaking); M. M. Ferlet, president of the French Gas Association; Col. Sir Harold Smith, chairman of the Gas Council; and Mr. W. K. Tate, president of the Institution of Gas Engineers

Semi-scale equipment has been something of a problem. Many tests cannot be carried out satisfactorily in the laboratory. On the other hand, testing with full-size industrial equipment would have involved considerable expenditure, a large amount of space and a level of power consumption (steam, electricity, etc.) beyond the resources of DERG. This meant that it had first to design and develop a whole range of pilot-scale equipment, and technical literature said very little on this point; having done so, it had to overcome the second and more difficult problem of interesting constructors in such small devices.

Accuracy Essential

When experiments are conducted on the pilot scale, accurate measurement of flows is an absolute necessity. Whereas this problem can be solved fairly easily in the case of air, water and petroleum oils, by using a capillary flow meter or a graduated diaphragm, the same does not apply with superheated steam; in the latter case, gradations can only be fixed for given superheating pressures and temperatures, and readings are likely to be falsified by unavoidable condensation.

The following system has been adopted to meet this difficulty: Nitrogen under pressure (500 g. of mercury) forces water through a capillary flow meter and a regulating valve into a vaporiser; the steam produced is superheated in a coil heated with the combustion gases from a burner using gas and air under high compression; the steam is then discharged into the furnace. With prior gradation of the capillary flow meter, it is possible to ascertain the flow of water that corresponds to a given drop in the level of the manometric fluid—in this case tetrachloroethane (which does not dissolve silicone greases).

For convenience, the complete apparatus for the production of superheated steam in known quantities has been mounted on a mobile chassis fitted with water, gas and electricity intakes (the latter for the burner fan). The base on which the vaporiser and superheater are mounted is itself movable in relation to the rest of the chassis, so that the steam outlet can be connected to the injection nozzles.

All chemical matters of interest to the gas industry come within the province of the chemical department of DERG, which undertakes research either on its own initiative or at the request of operational branches. The main lines of the programme are fixed by the director-general with particular reference to economic trends. For instance, some years ago the French gas industry reached a fairly advanced stage in the treatment of by-products, and about 1920 the production of anthraquinone brought the Gennevilliers plant into contact with the dyestuffs industry. But under the pressure of more urgent tasks research into the chemistry of coal tar has been almost completely abandoned. Some of the main projects at present in hand, or which have recently been concluded, will now be described.

It has been found necessary to give more attention than ever before to the causes of corrosion of equipment. The action of carbon dioxide on mild steel at atmospheric pressure is being investigated: mixtures of nitrogen, CO_2, oxygen and water vapour are either bubbled through distilled water in which plates under test are immersed (corrosion in liquid phase), or circulated in a chamber containing test plates suspended from a balance beam (gaseous phase). So far it has been shown that, in the case of liquid phase corrosion, if all other parameters are fixed, there is a linear correlation between rate of corrosion and time of contact; and the rate varies directly with CO_2 concentration, all other factors being kept constant.

Gaseous Corrosive Action Varies

As for the gaseous phase, the corrosive action of a gas not saturated with water vapour is very slight; the corrosive action of gases saturated with water at constant temperature is also slight; the corrosive action of gases periodically supersaturated remains practically nil as a result of small variations of temperature, since a layer of rust protects the metal; but the action of gases periodically supersaturated becomes very great when subjected to wide temperature variations, and no protective layer appears to be formed.

Propane-air mixture contains 14 per cent of oxygen, while town gas contains a maximum of 1 per cent. It was therefore to be feared that its corrosive action would be more intense, and this action was studied and compared with that of cracked propane.

It was found that cracked propane takes six or seven times longer to cause the same

degree of corrosion, and the violence of attack by propane-air is therefore far from negligible, particularly since this type of gas usually replaces coal gas in antiquated plant.

For a long time, unforseen liberation of hydrogen sulphide in gasholders has been reported. DERG intends to determine how far the generally accepted theory is correct: that cells are formed through local inconsistencies in the sheet iron used; that hydrogen so produced adheres to the metal and protects it from further attack until it is consumed by sulphur-reducing bacteria; and that further electrolytic corrosion then proceeds.

If the action of bacteria is confirmed, it will then remain to find the cheapest and most efficient antiseptic, for it is impossible to use cyanides, which do not affect the anaerobic organisms, or chromates (which it is believed are used in Great Britain) because they are much too costly in France.

Microbiologists are also studying bacteria which are prolific in clay soils surrounding gas mains, and which might be responsible for some of the damage usually attributed to electrical phenomena.

A technique of dephenolation by bacterial action has been tried out at two gas works, each producing 10,000 cu. m. per day, i.e., 7 cu. m. of water containing 3 g. phenol per l. The process has the disadvantage of requiring the circulation of large volumes of water, since the bacterial beds work only with concentrations of the order of 150 to 200 mg. phenol per l.

After a number of investigations, and the provision of concentrated bacterial stock by the Garches branch of the Pasteur Institute, it has been found possible to dephenolate water containing up to 1 g. per l, the quantity of phenols destroyed per 24 hr. per cu. m. of bacterial bed being increased from 100 g. (the generally accepted figure) to 2,000 g.

Use of Hydrocarbons Restricted

The French government having, at the end of 1948, passed a law restricting the use of light benzenic hydrocarbons, the processing of these to form compounds of higher boiling-point was investigated. One of the most interesting features of the process evolved, attachment of an ethylenic radical in the presence of aluminium chloride, is that it employs benzole and not pure benzene. The ethylenic compounds may be derived from coke-oven gas or from oil gases, or from propane-air.

The β- and γ-picolines and 2:6-lutidine are important starting-points for the synthesis of vitamins, sulphonamides, etc., but because their boiling-points are very close they cannot be separated by distillation alone. The DERG process consists of separation by entrainment with steam followed by cooling, giving fractions of 92-95 per cent purity. The operation is followed by chromatographic analysis using very small tubes filled with alumina impregnated with cupric chloride.

A more economic process than the usual soda treatment was also investigated, for the fractionation of phenolic oil into phenols, bases and neutral oils. One method employs azeotropy: an oil with the composition 70 per cent hydrocarbons, 28 per cent phenols, and 2 per cent base, gave a separation of 99.5 per cent of the hydrocarbons to 98.5 per cent purity, 99 per cent of the bases to 100 per cent purity, and 95 per cent of the phenols to 99.9 per cent purity.

Another method, which does not yield phenols in such a pure state, is based on the mutually antagonistic solvent powers of liquid paraffin and aqueous methanol. The methanol dissolves the phenols, while the liquid paraffin dissolves the hydrocarbons. After separation by decantation, entrainment by steam gives phenols of 97 per cent purity, and hydrocarbons of 96 per cent purity.

Welsh Chemical Engineering

A DEPARTMENT in chemical engineering to be set up shortly at University College, Swansea, would be the first in Wales, said Sir Lewis Jones, vice-president of the college, at the annual meeting of the Court of Governors on 26 November. He said there were certain difficulties to be overcome concerning accommodation, but an extensive building scheme was now in progress.

Principal J. S. Fulton said chemical engineering was the essential element in the new partnership of man with nature, and it was of the greatest importance that the University of Wales should not fall behind the universities of England and Scotland.

From the point of view of Wales, the universities, and in particular Swansea College, the establishment of a department of chemical engineering was a vital interest. The court would be glad to learn that they had advertised for the first holder of the new chair, and candidates would be interviewed within the next fortnight.

IN THE EDITOR'S POST

Corrosion Resistant Cements

Sir,—In recent issues of the technical press covering the chemical and associated industries, attention has been drawn to an account covering developments in resin-type cements carried out by the Billingham Division of the I.C.I., and published in the current issue (1954, **32**, [2], 94) of the *Transactions of the Institution of Chemical Engineers*.

We would like it to be known that our company have, for the past 18 months, been producing and using a phenol-furfural resin cement which has qualities similar to those attributed to the cements mentioned in the account.

This material is marketed under the trade name of 'Enolar' acid and alkali resisting cement, and in conjunction with A.R. tiles has been used quite extensively for industrial floorings and tank linings in the chemical industry.

'Enolar' cement is not put forward as a material to replace the normal furane type cements, but it is a valuable addition to the range, in that it is more resistant to certain oxidising acids than the furane and has greater adhesions when used in chemical brickwork structures.

It would be much appreciated if the above information could be published in the next issue of your journal, particularly as the account covering the I.C.I. findings stated that phenol-furfural cements were not commercially available in the UK.

Yours faithfully,

Director, D. P. HULBERT.
F. Haworth (A.R.C.) Ltd.,
London.

* * *

Fatty Acid Derivatives

Sir,—In the edition of your journal dated 6 November 1954, an article appears relating to the range of fatty acid nitrogen derivatives which are to be produced in this country by Hess Products Ltd. under licence from The Armour Company of Chicago. In the opening paragraph it mentions the range of chemicals now made solely by Armour of Chicago. To us this appears a little misleading as, of course, a full range of these products is manufactured by our principals, Messrs. Liljeholmens Stearinfabriks AB and have been available to the UK market through our agency for a period of several years.

Doubtless you would like to correct the impression given that Armour & Co. of Chicago are the only makers of such products.

Yours faithfully,

RALPH BYFIELD.

Director,
Guest Industrials Ltd.,
London E.C.3.

* * *

Catalytic Oil Gas Plant

SIR,—We were somewhat surprised and distressed to read on page 1138 of THE CHEMICAL AGE dated 27 November, 1954, of 'Britain's first catalytic oil gas plant.'

We cannot understand how this statement could have crept into the columns of such a paper as yours, for we feel sure that you must be aware that we have constructed catalytic oil gas plants in this country under the name of 'Segas catalytic oil gas process,' the first of which was put to work two years ago. Extensive reports appeared in the press about 17 December, 1953, on the occasion of the visit of the Minister of Fuel and Power to the Sydenham Works of the South Eastern Gas Board, where Britain's first catalytic oil gas plant was in operation.

You may not be aware that another Segas catalytic oil gas plant has been constructed for the North Eastern Gas Board at York. This plant has been at work since July, 1954.

For your information, and in order to keep your records complete, we are enclosing a leaflet describing the Segas catalytic oil gas process.

We understand that what Major Hugh Frazer, M.P., actually said when he visited Stafford was that the 'Onia' plant was the first *of its kind* in this country. This, of course, was true.

Yours faithfully,

H. HOPWOOD.

Publicity Manager,
The Power-Gas Corporation Ltd.,
Stockton-on-Tees.

Welding Research Work

BWRA Metallurgical Laboratories Open for Inspection

FOR the first time since 1950, the metallurgical research laboratories of the British Welding Research Association in Park Crescent, London, were open for inspection last week at 'Open Days.' The headquarters of the association were established at Park Crescent in 1946, and between then and 1950 the number of technical and administratve staff was doubled. Since 1950 there has been a further increase of 50 per cent, with corollary increases in research facilities, equipment and services.

In 1950 the association's total current expenditure was £67,000. Current expenditure for 1954 will be around £103,000. There are also laboratories at Abington, Cambridgeshire, where investigations are carried on into fatigue, brittle fracture, pressure vessels, pipe lines, resistance welding and non-destructive testing. It is planned to transfer the metallurgical researches to Abington, where there is considerably more space, in a few years time.

Work being carried on at Park Crescent covers a large number of aspects of welding, among which are the several varieties of cracking in welded steel joints, which have been the subject of separate investigations. Heat-affected zone cracking is liable to occur with alloy steels just outside the weld junction. On the other hand, hot cracking and fissuring can occur also with mild steel; occurring as they do in the weld metal, they are to a large extent characteristic of the type of electrode used.

Hot Cracking Tests

Hot cracking tests are being made with a hot-crack machine, whose capabilities are still being assessed. A wide range of electrodes is also being examined for hot cracking susceptibility, and the effect of various factors on hot cracking is being examined, such as sulphur content, plate metal composition and welding variables. It is hoped that it will be possible to elicit the significance of the various factors affecting hot cracking in an empirical way by these means. This work is complemented by work on the high-temperature tensile testing of weld metal specimens, by which it is hoped to relate regions of low ductility with liability to hot cracking.

Work on the fissuring which occurs in weld metal was initiated by the association about a year ago. The fissuring takes the form of fine intergranular cracks situated transversely to the welding direction. It has been shown that hydrogen content and rate of cooling both influence the occurrence of fissures, and some comparative work has been done covering the extent to which they occur with various electrodes.

Hard-zone Cracking

The problem of hard-zone cracking has, after extensive investigations, been resolved in terms of hydrogen content, alloy content of the steel and cooling rate. The liability of steel to cold cracking in the heat-effected zone has been related to a measurable physical property of steel, the end-of-transformation temperature. It has thus been possible to evolve a dilatation method for the assessment of weldability. New steels have been developed of high strength and good weldability in the Mn-Ni-Cr-Mo range, and also containing vanadium.

A start has been made on the basic work for the application of the self-adjusting arc welding process to steel. In particular, attention has been given to the thermodynamic considerations of the various gas reactions which might lead to porosity and the mechanical factors affecting the entrapment of this porosity in the weld metal. Work began several weeks ago on the effects of deoxidants, such as manganese and silicon, on the principal reaction thought to be responsible for porosity: $C + FeO \rightarrow CO + Fe$.

Electrical problems encountered in the self-adjusting arc welding process are being investigated in collaboration with the Electrical Research Association. The main aspects of the work are concerned with factors controlling the self-adjusting properties of arc and in particular the effect of power source characteristics; overall relationship between arc voltage, arc length, welding current and burn-off rate; and mode of metal transfer. The initial work is largely confined to aluminium alloys, but it is intended to investigate other materials as well, such

as mild steel, copper and stainless steel. The main work so far undertaken has been an investigation on the effect of power source characteristics, with particular reference to the degree of self-adjustment of the arc and drift in the output of the power sources. A special welding head has also been constructed for the work on arc parameters.

Hydrogen Analysis Apparatus

Apparatus evolved by the association about a year ago enables the hydrogen content in weld metals and the parent materials to be determined. The apparatus can be used both for steels and light alloys, and it has been designed to deal with a fairly high range of gas volumes on a micro-scale. In the case of steels, the samples are heated at about 700°C *in vacuo*. The volume of gas evolved is then measured and the hydrogen fraction estimated, using a palladium tube. The apparatus has also been used to elucidate a problem in aluminium welding, in finding the relative importance of various possible sources of hydrogen.

A diffusion pump and vacuum gauge proving system has been erected to examine the performance and characteristics of diffusion pumps and vacuum gauges, the work forming an essential preliminary to the setting up of apparatus for the determination of hydrogen by vacuum fusion. This, it is expected, will be in operation in the next 12 months, and it is planned to make a comparison between the results obtained by vacuum heating and vacuum fusion methods with the values of diffusible hydrogen content.

Work undertaken on heat flow, dilution and methods for evaluating weld properties has been applied to the welding of specific aluminium alloy. In the metal arc welding of H.10 alloy, for example, difficulties have been experienced in industry using Al5 per cent Si electrodes from weld cracking and porosity. It has been shown that when square edge close butt welds are used in relatively thick material, a crack sensitive composition is produced owing to dilution of the Al5 per cent filler by the parent plate. A silicon content in the weld metal as low as 1.6 per cent has been observed, the nominal content of the plate being 1 per cent.

Under similar conditions, when an Al10 per cent filler rod is used, cracking is generally avoided, and the silicon content of the fused zone is approximately 3½ per cent. To ensure freedom from cracking, the maximum dilution should be about 30 per cent with Al5 per cent Si electrodes and about 65 per cent with Al10 per cent Si electrodes. A butt weld slotted plate cracking test developed by the association has been used to assess the cracking tendency of particular weld compositions and is now being used by electrode manufacturers to help in the development of improved filler materials.

A detailed study has also been made of the factors responsible for weld porosity, and research has been carried out into improved filler materials for welding high strength. As a result of this latter work, new filler alloys have been prepared and so far the welded strength of thin gauge material has been increased from 60-70 per cent and with some materials to more than 70 per cent of the heat-treated plate.

The Yorkshire Dyeware & Chemical Co. Ltd.

The Yorkshire Dyeware and Chemical Co. Ltd. have announced an interim dividend of 5 per cent, payable on 31 December, to reduce the disparity between the interim and final payments. Total for last year was 20 per cent, including a bonus of 5 per cent.

Johnson, Matthey & Co. Ltd.

Johnson, Matthey and Co. Ltd. are paying an interim dividend of 3 per cent on the £3,987,435 ordinary capital for the year to 31 March, 1955. For the previous year an interim dividend of 3 per cent and a final one of 18 per cent were paid on the £1,329,145 capital, but it is pointed out that the change does not mean that total distribution for the year will be increased.

Karl Marx Soda Plant

The Karl Marx Soda Plant, recently inaugurated in Sofia, is said to rank second among the most important Bulgarian enterprises in the chemical industry, the first being the Stalin Chemical Works. For the present it will supply the cellulose, paper, soap, food and other industries. In the near future a caustic soda plant will be added to it, which, it is claimed, will produce all of the nation's requirements of caustic soda.

Raising Productivity

Fresh Thinking Urgently Needed in Industry

SIR BEN LOCKSPEISER, secretary of DSIR, speaking at the Working Conference on Research and Industrial Productivity, organised by DSIR in association with BPC and BIM, on 22 November, said :—

At the turn of the century when King George V, as Prince of Wales, opened the National Physical Laboratory, he used these words, 'The object of the scheme is, I understand, to bring scientific knowledge to bear practically upon our everday industrial and commercial life, to break down the barrier between theory and practice, to effect a union between science and commerce.' I doubt whether the objects of this conference today could be put more tersely. . . .

We are not the only industrial country thinking in terms of higher productivity and higher actual production, and we, with others, will be looking for a larger supply of raw materials, including fuel and power. We might, of course, go short of some essential materials. What we win from the earth we take once and for all, and although shortages threaten there is probably a good deal more to be found with the aid of modern geophysical and geochemical methods and with the help of new techniques in airborne equipment. We can no doubt also, with the aid of modern chemical technology and metallurgical processes, exploit ores of very low concentration hitherto considered of little value, as has been done in the case of uranium. Now more than ever we have to learn how to make what we have go further and use what we have to better purpose.

Selenium Typical Example

Selenium is a typical example of a material of which supplies are very limited and for which there are several industrial uses. It is of particular value to the electrical industry for the manufacture and export of rectifiers, and it is used also by the glass industry for decolorising glass containers, particularly milk bottles. If the export of rectifiers is in conflict with the attractive appearance of bottled milk we may be paying too high a price for keeping up appearances. The conservation and economic use of raw materials is an important consideration in the matter of productivity.

The raising of the productivity level that comes from the better use of resources, human and material, involves many problems which, to be solved, must first be identified. These are often hidden beneath obsolete practices, to be brought to light only by systematic study of the actual industrial processes, the handling of materials and the layout of plant, through technical surveys, work measurement, motion and methods study. The exploitation of this vast field can be very remunerative and the rewards are to be had at no great cost. It carries also advantages for the applied scientist himself. The study of industrial operations takes the scientist into the factory, on to the floor of the workshop, into the cost accountant's office and even into the home, and he thereby acquires a sense of reality and experience which is not only valuable in itself but adds to the power of his colleagues in the laboratory. . . .

Fully Automatic Plant

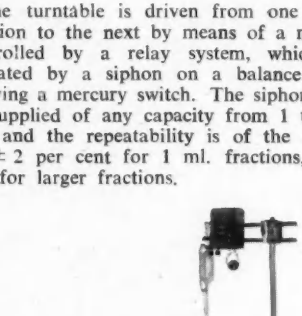
The fully automatic factory is on its way. The oil, chemical and food processing industries have been steadily moving away from batch processing to continuous operation embodying a measure of automatic control, and the metal-using industries in their engineering shops are moving in much the same direction.

There is a good way to go before highly complex techniques such as these can be reliably and generally established, but this is the way things are going and we are not likely to get much or perhaps any advantage from this revolution in technology without a new synthesis within the living body of industry. . . . Technology today is calling an expensive tune and it will not benefit anybody, either in private industry or in any form of state industry, to invest the large capital required for the new developments that are already upon us if the plant cannot be operated fully and economically. We shall all have to do a lot of fresh thinking, on human as well as technical problems, if an old traditionally minded democracy such as ours is both to preserve the freedoms it cares for and earn its living in a competitive world.

Towers' Fraction Cutter

ANNOUNCED by J. W. Towers & Co. Ltd., Widnes, is an automatic fraction collector for ion-exchange and chromatographic analysis. Designed by the National Institute for Medical Research, Mill Hill, the apparatus comprises a turntable carrying a circular anodised aluminium rack for 100 collecting tubes, arranged in spiral formation. Any test tube from ½ to 1 in. may be handled by using interchangeable racks.

The turntable is driven from one tube position to the next by means of a motor controlled by a relay system, which is operated by a siphon on a balance arm carrying a mercury switch. The siphon can be supplied of any capacity from 1 to 50 ml., and the repeatability is of the order of ± 2 per cent for 1 ml. fractions, and less for larger fractions.



Towers' automatic fraction collector

In the design of the balance arm normal knife edges have been replaced by crossed strips of thin oiled silk, which give adequate sensitivity and are unaffected by corrosive atmospheres. Practically the whole of the mechanism is enclosed in the box forming the base of the instrument, and is protected by a vitreous enamelled drain tray. The relays are hermetically sealed.

The apparatus is constructed so that ½ in. diameter scaffold uprights may be clamped in the four corners and a rigid structure erected to carry the chromatographic column and siphon balance.

Research Centre Grows

EXTENSIONS costing £150,000 are being made to the facilities at Woodstock Farm, near Sittingbourne, Kent, Shell's agricultural research centre in the UK. When completed next April, the enlarged research station will undertake all the agricultural research previously carried out at Shell laboratories in other parts of the country and in Holland. Woodstock will not only test, but synthesise and analyse many complex new chemicals. The total staff, at present 32, will be increased to nearly 100.

The new buildings will consist of three laboratories, an administration block, an engineering workshop and two glass houses. Laboratory space will be increased from the present 4,000 sq. ft. to 21,000 sq. ft. with separate departments for research on insecticides, fungicides, and herbicides and for chemical synthesis and analysis of new products. There will be a controlled temperature laboratory for the breeding of insects for experimental purposes.

Woodstock Farm was bought by Shell in 1945 for the purpose of testing out the possible applications of petroleum products as insecticides or weedkillers. With the great increase in demand for agricultural chemicals, for example, the insecticides aldrin and dieldrin, agricultural research has since assumed a new and growing importance. The work being carried out at Woodstock will help farmers and growers in their battle against pests and weeds.

More Wool Textile Chemists Needed

Speaking at a joint meeting of the Huddersfield branch of the Society of Dyers and Colourists and Huddersfield Textile Society at Huddersfield on 23 November, Dr. F. F. Elsworth, of the Wool Industries' Research Association, stated that more chemists would be needed in the wool industry in the future. Already more chemists were employed in the industry today than 20 years ago, but unfortunately not a great number of chemists were attracted to it.

New German Petrochemical Plant

The new petrochemical plant at Gladbeck, owned by the German Phenol-Chemie Company, has begun operations. Total output per year will be 25,000 tons.

Vacation Work in Industry

Progress of Imperial College Scheme Discussed

THE value of vacation work in industry by chemistry students was discussed by both students and representatives of industry at a conference convened by the Vacation Work Committee of the Imperial College Union at the Imperial College of Science and Technology, London, on 20 October. The conference, the proceedings of which have now been published, was organised to provide an opportunity to review the progress of the vacation work scheme in the last ten years of its operation, to share experiences in its operation and to invite suggestions for its improvement.

In his opening remarks the chairman of the conference, Professor R. P. Linstead, said there were two reasons why the scheme was of particular interest. Firstly, it was designed originally to provide students of the college with experience in British industry and, secondly, through the scheme had grown a national scheme for vacation work by which students spent some time abroad.

He went on: 'During the nine years this scheme has operated for students of chemistry, 551 students have been provided with experience, which averages a little more than 60 a year. Last year there were 70, which was the largest year, and represents about half the undergraduate body of chemists. We have about 150 or so undergraduate students of chemistry at the college and about 120 postgraduates. I am excluding chemical engineering students.'

Cream into Industry

Professor H. Levy pointed out that the best brains of the country were today drawn towards science and technology, and the cream had gone into industry and the universities, except for those with an urge to teach in the face of school shortages and lack of equipment.

'There is a process at work here with serious consequences to industry,' he went on. 'Have you considered what manpower you will need during the next ten years? Whether there are sufficient schools and equipment to provide it? Which industry can afford to ignore where the supply of its raw material is to come from? I mention this because we in this college, for example, are very much concerned with the problem of expansion. We have to get students of the right kind and quality who will be presently passed on largely to you, and we have to ask ourselves where are these students to come from. We have to turn to you because industry is one of the factors that has depleted the supply of science teachers to the schools.'

Essentials for Success

Dr. B. W. Bradford, of I.C.I., Billingham, speaking of the vacation training scheme, said: 'The first essential for the permanent success of the scheme is that the managers and technical staff who have to organise the vacation work shall be able to feel that the students are doing useful jobs in addition to whatever long-term advantages there may be; it is also essential from the students' point of view that they shall have the sense of doing a real job in its natural surroundings.

'Having given due care to the choice of assignment little more is required than to make sure that the student has full opportunities for seeing the way in which the organisation works and appreciating the friendly teamwork which is the backbone of a good industry. For science students, the practical side of vacation work, although valuable, is not usually the main benefit; it is almost unanimously agreed by vacation students that the main benefit to them lies in seeing how industrial laboratories and plants work and how the skilled scientist fits in and forms an indispensable part of it. Therefore, I suggest that any stage of a student's career is suitable for industrial experience, including pre-university experience.'

Dr. J. A. Tebboth, representing the Research and Development Department of the British Oxygen Co. Ltd., said: 'Owing to the incidence of holidays, it is always tempting to regard the vacation student as a replacement for research assistants on leave and, indeed, such is the interest of many students in the main research programme of the laboratory, that they would gladly prefer to work in such a capacity. In most cases, however, not only is it unethical to use the student as a temporary replacement for

staff, because of the disparity in salaries, but from the point of view of the graduate supervisor it is generally undesirable.'

He suggested that the best method was to allocate to the students a single problem which, although connected with the main research effort, did not need immediate solution and could wait until the students arrived. By this method some preliminary thought was given to the problem when the number of students accepted and their qualifications were known, and apparatus was ordered or set aside and an outline of research suggested.

Good Quality

The general quality of vacation students employed by the British Coal Utilisation Research Association was good, said Dr. D. T. A. Townend, Director General of the Association. Less than 2 per cent had not proved satisfactory, 'therefore, I think that any industrial concern considering this matter can generally speaking, accept vacation students with confidence.' Most foreign students, he continued, got along reasonably well and they had only had one case in which a man had not been able to do justice to his work because of language difficulty.

Contact with industry or research associations could be very valuable to a student passing through his university courses, particularly in physical chemistry, he went on. Some students found difficulty in absorbing and seeing the purpose of theory presented in abstract form. The sooner they made contact with processes, particularly those embracing gaseous systems, and observed the real practical applications of much they were learning in University, the better they were able to grasp the principles involved.

Dr. D. E. Adams of the Ministry of Supply mentioned some difficulties that had occurred in the working of the scheme. Among these were delay in confirming appointments caused by indecision on the part of the student as well as lack of promptness on the part of the employer.

He added: 'We have had quite strong representation from at least one University Professor that he was objecting to his students applying for these studentships on the grounds that they should be using the time—a very valuable six or eight weeks preceding their final year—by pursuing a more normal course of private study.'

The point of view of the student was put first by Mr. P. Walker, a postgraduate student of organic chemistry, who has been on work in England, France and Sweden.

He stressed the importance of participation in the social activities of the firm and good relations with the workers. On rates of payment he said: 'It is difficult for students to speak unbiasedly—we always want more than we can get, but there again it depends upon the cost of living and other things. In my own case I have always been paid adequately.'

Mr. P. J. Padley, an undergraduate student for the last two years, with experience in Britain and abroad, described the feelings of his colleagues.

'Taking the home scheme first, it seems the reaction of students to summer vacational work can be broadly divided into three classes,' he said. 'At the top we have a small minority of students who take exceptional note of the consideration shown to them by their employers. For example, great care taken in ensuring that the student gets what he needs, within reason, in laboratory training, and also a genuine interest of the company in the progress he is making.

'Secondly, the majority of us fall into what I call the middle category, where, broadly speaking, we have received roughly what we expected of the job. Although it has probably been of a routine nature, we feel we have learnt something from it, and can bring some of our experiences back with us into the laboratory the following year.

Disappointments

'Thirdly, a small percentage of us seem to be disappointed in some aspects either in the operation of the scheme, job, finance or lodgings, should they be away from home. I think by far the largest category is the job itself. The main trouble seems to arise from the fact that we often know far too little about the job before we start. It seems to be so because some companies, not many perhaps, seem to describe the type of employment offered perhaps a little too vaguely. Such expressions as "routine laboratory analysis" or such phrases are rather uninformative in view of what the job turns out to be. Is it not possible for industry to supply more information on the job offered? After all, I feel that the person who signs on for the Vacation Work Scheme does so with the thought in mind that here is an opportunity of seeing industry from the inside, and so he signs in the hope that the experience offered would be as wide as possible.'

Steam Engines to Penicillin Plant

Davey, Paxman Move With the Times

ALTHOUGH associated in the minds of most engineers with boilers and diesels, the firm of Davey, Paxman & Co. Ltd., Colchester, has in recent years extended its activities to embrace the production of several kinds of filters and welded chemical vessels. Representatives of the technical press were therefore invited last week to visit the works and inspect some of the products of the company.

Founded in 1865, Davey, Paxman soon became known as one of the leading manufacturers of steam engines and boilers in this country. The original 'Economic' boiler was a Paxman patent, and it was not until 1925 that the manufacture of diesels was begun. This required the development of techniques in welding light alloys, while the flourishing boiler business led to the manufacture of many kinds of fabricated work, including the now well-known vacuum filters.

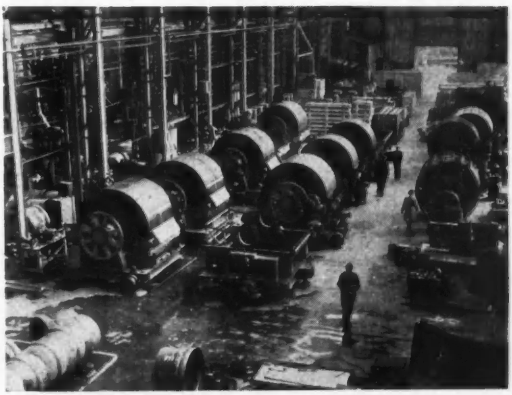
Paxman rotary vacuum filters are built in sizes from 2½ sq. ft. to 700 sq. ft., in cast iron, mild steel, stainless steel, monel, aluminium, etc., and can be covered with rubber or other acid-resisting materials to customers' requirements. The plants are capable of continuous operation for indefinite periods, and require practically no attention other than normal lubrication and the supervision of the filter cloth or other filter medium.

The drum box consists of a suitable number of self-contained vacuum and pressure-tight cells or compartments which are an integral part of the whole, and communicate with ports in the valvehead. Each cell is so shaped that the application of the vacuum is proportioned evenly over the width of the drum. The drum is supported by trunnions; in the smaller filters one trunnion is ported and one plain, while the larger sizes have both ported.

The cake is normally removed from the drum by a scraper knife. For the removal of colloidal cakes, however, a positively-driven doctor roller is substituted, and for a fibrous cake string discharge may be employed.

The trough in which the drum rotates may be of the 'low submergence' or 'deep submergence' type, and is generally provided with an oscillating agitator, the design and speed of which prevents the solids from settling. This is driven through a worm reduction gear from an independent electric motor. The drum drive is usually from an electric motor through one of the trunnions by spur and worm reduction gears, the speed of rotation being determined by the nature of the slurry. A variable speed may be incorporated if desired.

The valvehead is usually divided into three sections, the first being for the control of suction in the submerged cells; the second



A general view of the filter shop, with filters being prepared for despatch

for the control of suction in the unsubmerged cells; and the third for blow-back air. The suction is readily controlled by adjustment of the valves fitted to the respective outlets on the valvehead.

Among the many applications of the rotary filters are treatment of aluminium hydroxide, anthracene oil, blast furnace sludge, paper pulp, caustic lime, cellulose acetate, kaolin, coal slurries, penicillin broth, silica and sewage. It is, of course, impossible to generalise on the performance of filters capable of handling this variety of materials, and the company therefore maintain an experimental plant for work on prospective customers' samples. There is also a portable 10 sq. ft. pilot filter, which is hired out to interested firms (see THE CHEMICAL AGE, 1954, **71**, 654).

Another interesting filter, which is manufactured for Vickerys Ltd., who hold a licence from the original American manufacturers, is the Bird continuous centrifuge. This is a conical, horizontally driven centrifuge, giving the usual separation of solid and liquid by means of dams at the discharge. Solid is removed from the bowl, making the apparatus a continuous one, by means of a screw conveyor rotating so that the solid is discharged at the other end from the liquid.

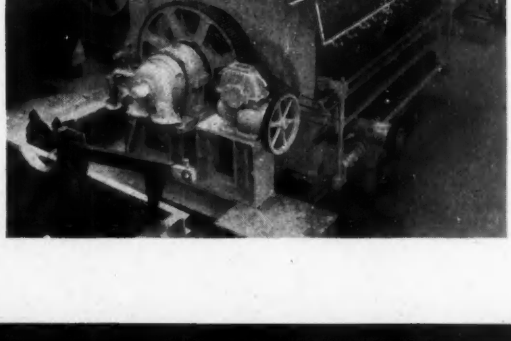
The Bird filter is built in seven sizes, the output of solids being anything from 200 lb. to 60 tons per hour, and of liquids, from 1 to 700 gal. per min. Slurries ranging from as little as 3 per cent solids may be handled with ease, and consistency and quantity may vary during operation without throwing the process out of its stride. Anything which will flow or can be pumped—containing solids up to ½ in. or more in diameter—is readily handled, and the slurry can be at any convenient temperature.

Other filters being made by Paxman's include the 'Acco' rotary disc filter produced in conjunction with the Automatic Coal Cleaning Co. Ltd., of Carlisle, which is particularly suited to flotation froths and raw slurries; the band filter, designed to the requirements of the sugar manufacturers, enabling charcoal to be washed, dewatered and returned to use, where before it was discarded; and the Kamyr filter for paper pulp, being made as the result of an agreement between Aktiebolag Kamyr Ltd. of Sweden and the Cellulose Development Corporation Ltd.

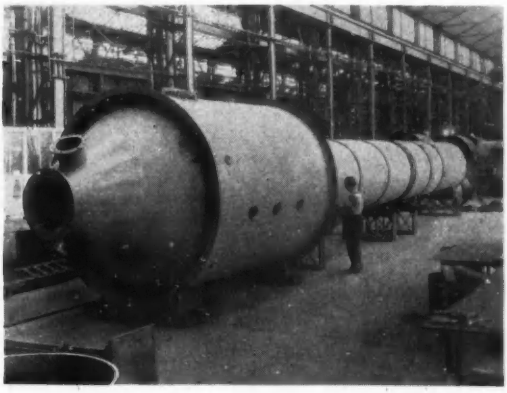
Three types of welding are in common use in the works. The first is the inert gas shielded process, used mainly for non-ferrous metals and stainless steel. The second is the argon arc process, for non-ferrous light plate work; and the third is the Lincolnweld automatic submerged arc for Class I pressure vessels in mild steel and all-welded and shell types of boilers.

Among the various pieces of plant seen in different stages of manufacture, one being completed was a stainless steel pressure vessel, with semi-elliptical ends, about 9 ft. in diameter by 12 ft. 6 in. high. It was constructed of stainless steel ⅜ in. thick, welded by both electrical and inert gas shielded arc, and tested to 154 lb. hydraulic pressure and 28 in. vacuum.

The standards room has recently been re-equipped, and among the apparatus maintained in the air-conditioned and tempera-



A 250 sq. ft. fabricated rotary vacuum filter for digest straw pulp



A 65 ft. long mild steel digestion tower, an integral part of the Celdecor continuous pulping operation during the production of paper from cereal straw, bagasse, etc.

ture-controlled room is an Izod impact tester; Hounsfil miniature tensile testing machine; and Brinell and other hardness testers.

The standards room is under the supervision of the quality control department, which is also responsible for the X-ray plant and all inspection. The X-ray equipment is a Newton Victor 250 kV 'Raymax', suitable for examining steel sections up to 3 in. in thickness. This enables all Class I welding to be inspected to ensure complete freedom from flaws.

In the boiler-making shops, some of the impressive equipment included an oil-fired plate furnace, working in conjunction with a 750-ton press, capable of flanging boiler end-plates up to 144 in. diameter by 1¼ in. thick; horizontal and vertical plate bending rolls, with capacity for plates respectively 12 ft. and 10 ft. 6 in. long; and a progressive flanging machine capable of flanging boiler ends over 10 ft. 6 in. in diameter.

Care has been taken over fuel economy throughout the works. The shops are maintained at an even temperature, and loss of heat minimised by the installation of air locks, and by keeping the outside surfaces of the factories clean and reflecting. The new office block, in course of construction, has no windows or doors opening directly into the open; lighting is from the roof; and the concrete floor is to be heated electrically during off-peak hours.

The shops are light and airy, and considerable care has been taken with the pastel colour schemes—quite an innovation in heavy engineering of this nature. There is no doubt that the 2,500 employees of Davey, Paxman & Co. are provided with excellent working conditions by an enlightened and progressive company.

Lightweight Building Material

A VERSATILE construction material which combines the advantages of wood and concrete is to be manufactured at a new $1,125,000 plant of Dominion Tar & Chemical Ltd. at Delson, Que. When completed, early in 1955, the factory will annually turn out 40,000 cu. yd. of the unique new substance. Called 'Siporex' (known in Europe as 'Zeprex'), it is based on a 20-year-old Swedish patent.

Siporex is a precast, light, cellular concrete, produced in slabs for walls, roofs and floors. The material is made by a patented process from finely ground sand, Portland cement and chemical additives. Curing is achieved by subjecting the product to high-pressure steam in autoclaves. The material has a high strength-weight ratio and exceptionally good insulation value, is said to be highly resistant to fire and thermal shock and is virtually free from shrinkage.

Siporex is one fifth the weight of concrete and can be sawn, hewn and bored with conventional hand tools.

British and Alberta interests have set up a plant at Calgary to produce another Swedish chemically-aerated lightweight concrete, in block form, 'Ytong.' It is sawable and nailable, and the lighter grades will float.

Earthing Electrical Installations

By A. G. Thomson

IN considering the safety aspects of electrical plant installations in chemical factories, it is usually impossible to dissociate safety to operatives from what may be essentially protection of plant.

The electricity regulations made under the Factory Acts, 1901 and 1937, require that 'where necessary to prevent danger adequate precautions shall be taken by earthing or other suitable means to prevent any metal other than the conductor from being electrically charged.' The chief object of earthing is thus statutorily recognised to be the avoidance of risk to persons from electric shock due to contact with accessible live parts of electrical apparatus not intended as conductors. This risk is not confined to metal.

The installation of main system earths is outside the scope of this article, which is concerned only with the precautions necessary to ensure safety in plants. The point of demarcation between process plant and main system may be taken for this purpose as the outgoing terminals of the main service switch, isolator or distribution board in the plant. It is assumed that the metalwork of the main distribution equipment is solidly bonded to earth in the electricity sub-station by means of metallic armourings and enclosures of cables, or by bonding strips, to provide an adequate path for fault currents back to the system earth.

Permanent Installations

Earthing does not prevent danger unless on the occurrence of a fault the combined resistance of earth connections and earth electrode, where fault current is passed into it, is low enough to permit sufficient fault current to flow to operate the protective devices and isolate the circuit without allowing any of the earthed portions of the system to attain a dangerous potential to earth or to each other. In no case should the resistance of earth connections between a plant item and the earth electrode be allowed to exceed 1 ohm. Where there is a risk of the potential to earth between any accessible conducting parts of an installation, other than the circuit conductors, exceeding 40 volts—IEE Regulations 1005 and 1006—protective devices should be installed to disconnect the supply automatically. The resistance between the earth electrode or electrodes and the general mass of the earth should not at any time exceed 2 ohms.

The principal methods of earthing of plant items are by connection to: (1) the main earth electrode of the system supplying electricity to the plant item; (2) local buried metallic water main; or (3) a specially installed local earth electrode.

The design and installation of earth electrodes is dealt with fully in Reports F/T.50 and F/T.59, issued in 1932 by the British Electrical and Allied Industries Research Association. These reports emphasise the desirability of connections to buried water mains where suitable and should be carefully studied before any type of earth electrode is selected, since each case must be decided on its merits.

The connections from individual electrical plant items should be made to a common busbar connected to the earthing system adopted for the plant. All earthing connections should be installed so that they are protected from mechanical damage. No automatic circuit-opening devices should be introduced into any earthing conductor. For additional information regarding types and sizes of earth leads for fixed electrical apparatus, reference should be made to the IEE Regulations for the Electrical Equipment of Buildings, Section 10.

The effectiveness of earthing depends on the continued satisfactory performance of every part of the complete earthing system, which should therefore contain only the materials best suited to the situations in which it is installed. High-grade workmanship is essential, and facilities should be provided for routine testing.

Before a new installation is put into service, the resistance of all earthing connections should be checked by the passage of an alternating current of not less than 5 amp. derived from a suitable low-voltage source. The results of the tests should be recorded for the various parts of the whole installation, so that by reference to them the progress of any successive deterioration can be kept under observation. A check should

subsequently be made of these values of earth lead resistance at six-monthly intervals, records being kept.

The resistance of the earth electrode should be measured initially before the installation connected to it is put into service and subsequently at six-monthly intervals. This is carried out by passing a steady alternating current between the earth electrode and an auxiliary earth electrode placed at such a distance from it that the voltage gradient of either electrode alone, when measured by ordinary commercial instruments at the station of the other electrode, is not detectable (IEE Regulations 1106 and 1107).

A second auxiliary electrode is then inserted midway between the earth electrode and the first auxiliary earth electrode, and the voltage drop between the earth electrode and the second auxiliary earth electrode is measured. The current is also measured and from this value, together with the voltage reading, the resistance of the earth can be calculated.

Regular visual inspection of all earth leads should be made at three-monthly intervals to ensure that no deterioration is taking place.

Maintenance consists in keeping the earth resistances of all parts of the installation within the values specified above. It is mainly a matter of cleaning connections and replacing faulty sections of the earthing system. A careful check of earth electrode resistance should be kept during spells of very dry weather to ensure that a low value is maintained.

Temporary Installations

By the nature of the work they have to perform and the conditions under which they may be used, temporary electrical installations at standard supply voltages constitute a high risk to persons unless the greatest care is exercised in the selection of equipment, its erection and use, and an efficient system of maintenance and records is adopted.

A temporary electrical installation is one which is intended to remain in continued service for not longer than three months. This designation might be regarded as covering temporary extensions to existing plant; temporary repair work; temporary services for construction projects; or temporary connections for testing purposes.

Industrial Safety

Temporary installations for construction purposes can often be much reduced or entirely avoided by the early erection of the final permanent installation. Installations of a temporary nature in existing plant should not be permitted except where excessive cost or great inconvenience might otherwise result. Immediately a temporary installation has served its purpose, it should be taken out of service, disconnected and dismantled.

The entire system forming part of a temporary electrical installation should be suitable for the conditions in which it is to be used. The installation should be in the charge of a competent person responsible for its maintenance and safety in use. Before being put into service it should be tested to prove the adequacy of earthing and insulation resistance.

All metal enclosures and supports which might become live should be solidly earthed, and the resistance between earth electrode and any other earthed position of the installation should not exceed 1 ohm. All earthing terminals and earth bonds should be visible, and the latter should have a conductance not less than that of a 0.0225 sq. in. copper conductor. Means should be provided for the insertion of testing equipment at each earth electrode.

All temporary installations should be inspected weekly by a competent person, by whom any defects should be reported in writing. Any defect reported should be rectified immediately and noted in the register. The person in charge of every temporary installation should be provided with comprehensive diagrams covering the whole of the installation. Besides showing the system of connections, the diagram should indicate the location and rating of protective devices, conductor sizes, and the voltages to earth of all parts of the installation.

Earth Free Treatment

In some electrolytic and electrothermal processes it is unavoidable that certain parts of chemical plant should be alive at potentials above earth, which would be potentially dangerous to life if operatives working on the plant were able to make circuit with

Industrial Safety

live parts of the plant and other conducting materials connected to earth.

In such situations it may be necessary to make a whole process room and its approaches into an 'earth-free' area; i.e., an area in which there is no likelihood of an electric shock to earth from any live metal. This may be accomplished by sub-dividing rooms with insulating walls and barriers, and insulating all conducting materials, so that it is impossible for persons to make circuit between live parts of the plant operating at potential differences greater than 40 v AC or 125 v DC.

The maintenance of earth-free conditions requires constant vigilance and frequent inspection. Owing to the likelihood of deposits of conducting chemicals on insulating surfaces, the maintenance in chemical works of earth-free conditions is particularly difficult, and for this reason earth-free installations should not be proceeded with unless there is no alternative.

The use of electrically-operated portable and transportable equipment in earth-free areas is not recommended on account of the difficulty of protecting against fault conditions and at the same time retaining the earth-free feature.

Where non-electrically operated portable or transportable equipment is used in an earth-free area, particular care should be taken to avoid the introduction of earthed metal work as, for instance, through the metallic reinforcement of air hoses.

Precautions should be taken against the fire risk in earth-free areas, which may be caused by sparking or arcing, even at low potentials, in the vicinity of combustible materials.

Warning notices should be provided at all points of access to earth-free areas. In some instances the earth-free area may have to be extended to some distance from the process building in order to avoid danger to persons approaching the building, who may be carrying conducting materials capable of bridging between points above earth potential within the earth-free area and points at earth potential outside the area.

Acknowledgment is made to Imperial Chemical Industries Ltd. for the information on which this article is based.

Safety Notebook

PLANS to stimulate the development of industrial health services in workplaces covered by the Factories Acts were announced in the House of Commons on 11 November by Sir Walter Monckton, Q.C., Minister of Labour and National Service. The plans include the appointment of a standing Industrial Health Advisory Committee to advise the Minister, a review to find out where industrial health services are most urgently needed, and the promotion of surveys and field investigations where further information is required to determine the need for preventive measures or research.

The Minister paid tribute to the work already done in industry, both voluntarily and under the Factories Acts. He feels, however, that a new impetus is now wanted to extend and develop the provision of health measures in factories. This he proposes to give, acting within the framework of existing legislation.

Sir Walter said that the general aim will be to develop industrial health services on a voluntary basis. He pointed out, however, that he would also consider, in appropriate cases and after full consultation with the parties concerned, making use of his statutory powers under the Factories Acts. 'I am sure that the further development of industrial health services in industry can make a material contribution to our social and economic progress,' added Sir Walter.

The National Joint Advisory Council approved the plans at its meeting on 27 October, and discussion has taken place with medical and other interested bodies.

The industrial health services are not limited to purely medical matters. They include the provision of good environmental conditions—sanitation, heat, light, ventila-

tion, atmosphere and cleanliness—at the place of work, protection against disease and poisoning resulting from the process of work and the materials used, and adequate medical and nursing supervision and first aid.

* * *

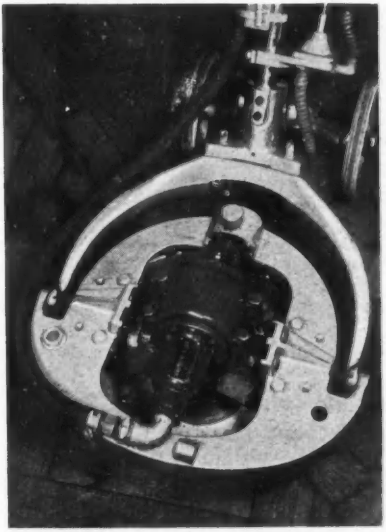
ADVICE on handling phenol is contained in a booklet issued by Monsanto Chemicals Limited and obtainable from them at Victoria Station House, Victoria Street, London S.W.1. It is pointed out that phenol is inflammable and its vapours mixed with air can be explosive. In contact with the skin it will cause painful and dangerous burns and it is toxic when swallowed or when droplets of vapour are breathed into the lungs.

If accidental bodily contact occurs, speed of removal is of primary importance, the booklet says. A safety shower with a quick opening valve must be available close to the phenol pump or draw-off line. If an operator gets phenol on his skin, it must be washed off immediately with copious amounts of water. All clothing should be removed and water washing continued until the odour of phenol cannot be detected on the skin. Alcohol or glycerine can be used to help remove the phenol from the skin. If the eyes are contaminated, they should be washed with running water for at least 15 minutes. If phenol is accidentally swallowed, the patient should be made to swallow profuse quantities of weak salt or baking soda solution, milk or even water. Vomiting must be induced and a doctor should be called at once.

It is recommended that workmen who handle phenol should wear goggles or face shield, rubber gloves and rubber boots. The most stringent fire precautions should be taken while it is being handled. Riveted or welded tanks are satisfactory for storing phenol, with steam coils for melting out, preferably outside the tank. Contact with iron, copper or bronze will cause discoloration and molten phenol readily attacks aluminium, lead, zinc and magnesium.

* * *

A RANGE of flash- and explosion-proof floor cleaning machines which are said to scrub, scrape and polish with absolute safety in spite of the presence of inflammable materials or combustible gases has been produced by Columbus-Dixon Ltd., Wembley. The flash-proof motor is driven by compressed air at 80-100 psi. and 30 cu. ft. per minute free air flow. The machines are said to be in use at I.C.I.'s polythene plant at Wilton.



Columbus-Dixon safety polisher

AN inquest was held at Dewsbury, Yorks, on 22 November, on James William Petyt, aged 38, who sustained fatal burns in an accident at the works of J. Brown and Co. Ltd., manufacturing chemists, Savile Town, Dewsbury, on 3 November.

James Lyons, of 82 Listing Lane, Littletown, Liversedge, gave evidence that at the time of the incident he was employed as a process foreman in charge of the sulphur extraction plant. He said that he and Petyt took the usual precautionary measures when opening the door of an extractor. As there was no issue of water from it the process appeared to be a 'dry batch'. About four or five minutes later on turning round and walking away he heard a shout but was unable to see Petyt, for there was a lot of steam and water flowing on the floor.

Although he could not see for steam he ran through the hot water four or five inches

Safety Notebook

Safety Notebook

deep, made a grab for Petyt and appeared to get him by the back of the neck. He said Petyt jumped up in a hysterical condition and was later removed to hospital. Lyons, who was scalded on his hand and arm, told the Coroner, Mr. B. W. Little, that he had never known a similar incident.

* * *

TWO handbooks available from the US National Bureau of Standards, Washington, are 'Permissible Dose from External Sources of Ionising Radiation' (Pp. 79, 30 cents) and 'Protection Against Radiation from Radium, Cobalt-60 and Caesium-137' (Pp. 60, 25 cents). The recommendations and discussions of permissible dose contained in the first handbook form the basis of all other recommendations of the National Committee on Radiation Protection. They include permissible doses for material within the body, safe handling, waste disposal, etc. The second book describes equipment and facilities for handling, storage and transportation, medical and non-medical applications, protection surveys and personnel monitoring, accidents, decontamination and disposal of radium, caesium and cobalt.

* * *

NOW being distributed with 'The Belles of St. Trinians' is 'The End of the Road', a film dealing with the problems of retirement. Made by Group 3 at Beaconsfield, its cast includes Finlay Currie, Naomi Chance, Duncan Lamont, Edward Chapman and David Hannaford. An interesting point about this film is that the protective clothing worn by the actors in the plating shop sequences was provided by Airguard Ltd., 103 King Street, London W.6. This company can supply over 100 different types of industrial gloves made in leather, rubber, fabric and PVC, together with aprons, overalls, headwear and footwear.

* * *

THE Fire Protection Year Book, 1955, is the 15th edition of what has come to be known as 'The Fire Fighters' Encyclopædia'. To all those concerned with the prevention and extinction of fire it is an indispensable reference book. As in previous editions the subject matter is divided into eight comprehensive sections.

Section I constitutes a directory of all the public fire brigades and salvage corps in the British Isles; Section II is a directory of industrial and private fire brigades, while Section III relates to the fire services of the Commonwealth and Empire. In Section IV are given details of civil defence authorities and their officers; Section V deals with Government departments and public authorities concerned with fire prevention; Section VI contains particulars of associations, institutions and societies interested in, or actually connected with, fire fighting and fire prevention; Section VII and VIII respectively deal with the legal aspects of fire safety and fire engineering technicalities and essential statistics.

The 1955 Year Book includes a comprehensive list of suppliers of fire safety equipment; classified list of such equipment; trade names, and a useful desk diary.

* * *

A TOTAL of five people were killed in accidents in chemicals, oils, soap, etc., factories during October. There were 26 cases of chrome ulceration reported, 16 acquired in the manufacture of dichromates and ten in chromium plating. There were two cases of aniline poisoning and ten of skin cancer. One person died from compressed air illness.

* * *

ON 8 November the Pneumoconiosis and Byssinosis Benefit Amendment Scheme, 1954, made under the Industrial Diseases (Benefits) Acts, 1951 and 1954, came into operation. The scheme now made extends the Pneumoconiosis and Byssinosis Benefit Scheme to cover people partially disabled by pneumoconiosis or byssinosis who have never received workmen's compensation or industrial injuries benefit for their disease. Benefit for partial disablement under the new scheme is £1 a week, which may be increased where the person entitled to the allowance is unemployable.

The Industrial Diseases (Miscellaneous) Benefit Scheme, 1954, which came into operation on the same date, makes provision for uncompensated cases of certain other diseases. It provides that where neither workmen's compensation nor benefit under the National Insurance (Industrial Injuries) Act, 1946, is payable, benefit may be paid out of the Industrial Injuries Fund to or in respect of people who are disabled or die or have died since 31 December 1949 from certain types of skin cancer of industrial origin (including 'mule-spinner's cancer') or from diseases due to excessive exposure to radio-active substances.

GRUNDRISS DER CHEMISCHEN TECHNIK. By F. A. Henglein. Verlag Chemie. 8th Ed. 1954. Pp. 762. DM.49.80.

This eighth edition of Professor Henglein's well-known book contains a number of new sections and a great deal of the earlier text has been completely rewritten. The essential character of the book is, however, unaltered and it remains a remarkable reference text of chemical technology. It is impossible to think of any material, process or equipment used in the chemical industry which is not mentioned in the text, in most cases with sufficient information to give the student the basic details of the process or origin of the material. Each subject is headed by a list of references for collateral reading.

The book is divided into two parts. The first part, General Chemical Technology, consists of 16 chapters dealing with unit operations and processes. The second part, Special Chemical Technology, is divided into six main sections dealing with the raw material of industry—inorganic products (technical gases, acids, alkalis, etc.), organic products (fuels, intermediates, dyestuffs, pharmaceuticals, etc.), natural products (sugars, alkaloids, fats and waxes, etc.), applications (agriculture, foodstuffs, explosives, etc.) and structural studies of macromolecules (rubber, gelatin fibres, etc.).

Naturally in order to give some information on each of a large variety of subjects the individual sections have become little more than a précis of the available information. Thus distillation, including industrial equipment, is dealt with in eight pages, absorption in two pages, synthetic dyestuffs in eight pages and so on. It is not, however, a handbook of the type of Perry or Lange, but rather an advanced text book for the university graduate in pure chemistry or mechanical engineering entering the chemical industry and following a conversion course in chemical technology—not chemical engineering. The book will be of value not only to young graduates entering industry and to students of chemical technology, but also to workers in the chemical industry as a reference text.—F.M.

CALCULATIONS OF ANALYTICAL CHEMISTRY. By L. F. Hamilton and S. G. Simpson. McGraw-Hill Publishing Co. Ltd., London. 5th Edition. 1954. Pp. 340. 40s.

To those familiar with the previous editions, it is only necessary to say that in the new edition much of the material has been revised, rewritten, expanded and brought up to date where necessary. The completely new sections include processes involving the use of bromate and iodate, and an introduction to colorimetry. Such topics as potentiometric, conductometric and amperometric titrations, titration curves, electrolytic methods, errors and precision measures have been thoroughly revised.

To those still unfamiliar with this work, but who desire to make acquaintance with a subject of fundamental importance, it may be safely said that this is the best available text of its kind, at any rate in the English language. It is designed essentially to supplement courses in both qualitative and quantitative analysis, and the authors have succeeded in covering a very wide field without overburdening the text.

The book is divided into six main parts dealing with general analysis (6 chapters), gravimetric analysis (4 chapters), volumetric analysis (5 chapters), special methods (5 chapters), common analytical determinations (detailing the most suitable methods for the determination of the elements) and problems on specific groups in qualitative analysis and on quantitative analysis.

Some idea of the scope of the book may be obtained from the fact that there are almost 1,000 problems and answers given, most of which will provoke thoughtful interest. It is obvious from the nature of many of the problems that the authors have a close contact with the problems encoun-

tered in actual practice. Numerous worked examples are given in the text and each chapter is generously prefaced by a readable description of the essential principles involved.

The keynote of the text is simplicity, yet the treatment is such that it will adequately cater for all classes of student up to the final Honours stage. All who are concerned with the teaching of analytical chemistry will accord a warm welcome to this new edition, which contains enough new matter to discount substantially the value of the previous edition.—A. J. NUTTEN.

MASS SPECTROMETRY. By A. J. Robertson. Methuen and Co. Ltd., London. 1954. Pp. 135. 8s. 6d.

In 1886 Goldstein passed an electrical discharge at low pressure through a tube containing a cathode perforated with a number of holes, and discovered the presence of positively charged particles. This work was further developed by Wien and also by J. J. Thompson and it was shown that these positive particles could be separated by magnetic and electric fields. If polyatomic molecules were introduced into the discharge tube it was also found that these molecules dissociated with the formation of a variety of positively charged fragments. Later work by Aston and others revealed the presence of numerous isotopes among the elements, these results being obtained with mass spectrographs in which the separated ion beams could be photographed and measured. At the present time the term mass spectrometer is usually restricted to an instrument in which the ion beams are measured electrically.

Modern mass spectrometers can be used not only for the quantitative analysis of mixtures of known components but also for the qualitative analysis of unknown substances. Some useful examples of the latter can be found in a recent paper on the use of mass spectrometry by J. H. Beynon in *Nature*, (1954, **174**, 735). Although mass spectrometry can be more easily used for identifying a pure substance, it is usually possible from the mass spectrum of an unknown sample to determine if it is a mixture.

In his small monograph on mass spectrometry Dr. Robertson has divided his subject into some six chapters, including an historical introduction. The survey of the principles involved in the operation of mass spectrometers covers the production, magnetic focusing and measurement of ion beams, and pumping and gas manipulating systems. There is a substantial discussion of the ionisation and dissociation of molecules induced by electron impact. The account of the use of mass spectrometry in chemical analysis describes the general principles of the analysis of gaseous mixtures, and the analysis of liquids and solids. The methods by which mass spectrometry can be used to investigate the formation of free radicals and to measure isotopic abundancies are also described.

Research and industrial scientists should find this a most useful monograph dealing with an experimental technique of increasing importance.—G.S.E.

TEACH YOURSELF BIOCHEMISTRY. By P. H. Jellinck. English Universities Press Ltd., London. 1954. Pp. 199. 6s.

Why anyone should wish to teach himself biochemistry, and whether, indeed, such a desire is to be encouraged, are questions which it is unprofitable to discuss. Given the situation, it is essential that the prospective student should have the very best tuition. Every precaution must be taken to ensure, not only that the facts he is given are unquestionable, but that they are presented in an unambiguous way. A qualified reader can read the sense behind distorted grammar and can correct the occasional misprint, but the ignorant must believe every statement.

No-one would question that Mr. Jellinck's background qualifies him to be the author of a book of this sort, since a research biochemist at the Courtauld Institute is in the position of Caesar's wife. But the infelicities of syntax and the errors of typography evoke little but confusion; and although printer's errors are not many, one, at least, is sufficiently capricious to invalidate completely the description of the Warburg manometer.

The facts are there, and it is a very up-to-date exposition of the subject; it would make a good revision book for an elementary course in physiology. But to the armchair scientist it cannot give that conception of the processes and aims of biochemistry which even a cursory and only-half-understanding reading of Baldwin's 'Dynamic Aspects of Biochemistry' would.—B.I.

HOME

Employment Up

According to figures published in the November issue of the Ministry of Labour Gazette, 2,000 more people were employed in the chemical and allied trades at the end of September than at the end of the previous month. The total number reached 516,000, compared with 498,000 at the end September 1953.

Bigger Pay Packets

Wages of about 169,000 people in the chemical and allied trades increased in the first ten months of the year. The estimated net increase was £43,900 weekly.

Long Service

At a presentation of long-service awards at Weston Point, Runcorn, 31 employees of I.C.I. General Chemicals Division (Runcorn) were congratulated by Mr. D. H. Carter, joint managing director of the division, on completing 800 years' service between them.

London Depot Opened

To give a more efficient service to customers in the southern counties, Sir W. H. Bailey and Co. Ltd. opened a London sales depot at 4 Domingo Street, Clerkenwell, E.C.1, on 1 December. Their range of Foster reducing valves and ancillary products is carried in stock. With effect from the same date the London office transferred to the new address from Dartmouth Street, Victoria, S.W.1. The telephone number of the new combined depot and London office is CLErkenwell 0791/2.

Sugar Beet Factory

In a written reply to Mr. Anthony Hurd, M.P., in the House of Commons on 24 November, the Minister of Agriculture (Mr. D. Heathcoat Amory) said that the erection of a new sugar beet factory in the south of England could not be justified in existing circumstances. He pointed out that the savings in operating and transport costs would not balance the capital charges involved in building a factory and that any further increase in home sugar beet acreage would displace imports which the Commonwealth had been encouraged to produce under the Commonwealth Sugar Agreement.

Unemployment in October

There were 4,171 people in the chemical and allied trades in Great Britain unemployed in October, an increase of 165 over the previous month. Of this total, 2,334 were men and 1,837 women.

New Year Revels

The annual dinner and dance of the London branch of the Institute of Metal Finishing is to be held on New Year's Eve at the Rembrandt Hotel, Thurloe Place, S.W.7.

Natural Gas Search

The boring near Crowborough, Sussex, undertaken in June by the Gas Council in a search for natural gas is nearing completion. Gas has not been yielded in commercial quantities, but it has been decided to make a seismic survey over the area with a view to a possible siting of a second well.

More Gas from Oil

The Eastern Gas Board has placed an order with the Power-Gas Corporation Ltd. for a SEGAS installation—catalytic oil gas plant—at Ponders End works. It will comprise one unit to produce 3,200,000 cu. ft. of gas per day from 32 tons of fuel oil, together with all necessary ancillary equipment, gas cooling and naphthalene removal plant. The main contract is worth about £130,000 and the whole installation will cost some £350,000. The scheme allows for future extension.

Import Ban on Insecticides

A recent Egyptian law (No. 509 of 1954) forbids trading in or importing of insecticides into Egypt without the authority of the Egyptian Ministry of Agriculture. The Ministry will shortly issue an order indicating those insecticides which may be imported and sold in Egypt and specifying the composition of each insecticide. A copy of a French translation of the law can be inspected at Export Services Branch (Tariff Section), Board of Trade, Room 602, Lacon House, Theobalds Road, London W.C.1. Tel.: CHAncery 4411, Ext. 276 or 679.

• OVERSEAS •

Carbon Black Shipments Up

Compared with August, shipments of carbon black in the USA increased by 25 per cent in September, as strikes in the rubber industry were settled. Daily average production in September declined slightly.

New Indian Oil Refinery

A Standard Vacuum Oil refinery was opened on 19 November at Trombay, near Bombay, India, by Mr. K. C. Reddy, Minister of Production. The refinery, which cost more than £13,000,000, is the largest single dollar investment in India.

Nuclear Energy Research

Plans for a $1,535,000 expansion of its nuclear energy research facilities have been announced by Battelle Institute of Columbus, Ohio, USA. The new facilities will be used for enlargement of the Institute's contract research in the development of peacetime uses for atomic energy. They are in addition to present facilities at its Columbus laboratory available for nuclear research, in which the Institute has $2,000,000 invested.

Yugoslav Copper Industry

The possibility of increasing Yugoslavia's copper production from the present 31,000 tons a year to 55,000 tons a year was foreseen at a recent consultation of mining and metallurgical experts at the Bor Copper Mine. The reserve of copper ore in Yugoslavia is estimated at some 175,000,000 tons, of which about 75 per cent is situated in the Majdanpek district of Eastern Serbia.

Steady Zinc Oxide Output in US

Total production of lead-free and leaded zinc oxide in the US in September remained virtually unchanged from the output in August, according to the Bureau of Mines. Lead-free zinc oxide production declined from 12,600 short tons to 12,100 tons, while the output of leaded zinc oxide increased 600 tons to 3,400 tons. Producers' stocks of oxide dropped slightly during September, continuing the almost uninterrupted trend which started early in the year. Total shipments of oxide increased from 14,500 tons in August to 16,300 tons in September; lead-free oxide shipments increased 10 per cent to 12,500 tons and shipments of the leaded grade increased 20 per cent to 3,800 tons.

Niobium

Norway has became one of the world's biggest producers of niobium, which is used in the manufacture of jet engines, writes the Oslo newspaper *Arbeiderbladet*. Monthly exports now amount in value to about £35,000.

I.C.I. Open Australian Research Station

A research station to assess Australia's rural economy has been established near Melbourne by Imperial Chemical Industries Ltd. It will specialise in animal husbandry and crop protection. The station was officially opened on 16 November by the chairman of I.C.I., Dr. Alexander Fleck.

Salt Mining Concession

A concession has been granted to NV Koninklijke Nederlandsche Zoutindustrie, Hengelo (Province of Overijssel), for mining rock salt, anhydrite, potassium salts, etc., in a tract of land covering an area of just under 7,000 acres in the province of Groningen, North Holland. The salt to be mined in the area is to be used as raw material for soda works to be erected at Delfzijl.

Nitrate Fields Transferred

New fields bearing sodium nitrate are being transferred to the Anglo-Lautaro Nitrate Corporation from the state-owned Chilean Nitrate and Iodine Sales Corporation under a decree signed recently by the President of Chile. The area to be transferred comprises 2,000,000 square metres, and refined nitrate production there is an estimated 6,000 tons.

Felt from Terylene

Canadian Industries (1954) Ltd. is experimenting with a process to manufacture high-strength industrial felt from Terylene, now coming into production at Millhaven, Ont. One of the major future uses of the new 'wet end' felts is understood to be in the paper machines of Canada's huge pulp and paper industry. The new product will be composed of about 30 per cent Terylene, lengthening the felt's life and resulting in more efficient water removal. E.I. du Pont de Nemours recently developed a process for making felt out of Dacron polyester fibre.

· PERSONAL ·

Sharples Process Engineers Ltd. announce that ALAN J. HAYTER, B.Sc., Ph.D., A.I.C.E., has taken up an appointment as technical representative for the firm. Dr. Hayter was formerly with Head Wrightson & Co. Ltd.

MR. F. G. JAMESON, B.Pharm., F.P.S., managing director of Matthews & Wilson Ltd., 6/8 Cole Street, London, S.E.1, is leaving to take up another appointment. MR. H. D. R. MATTHEWS, M.P.S., has been appointed general manager.

At the recent general meeting of the Research Association of British Paint, Colour and Varnish Manufacturers, MR. D. L. ANNAND (Ault & Wiborg Ltd.) was elected President. Other officials and council members are:—*Vice-presidents,* MR. H. C. FLETCHER (International Paints Ltd.) and MR. S. E. K. THORNLEY (Thornley & Knight Ltd.); *hon. treasurer,* MR. C. W. A. MUNDY (Younghusband, Barnes & Co. Ltd.); *council (six vacancies),* MR. N. A. BENNETT (Griffiths Bros., London, Ltd.), MR. J. W. COLE (Arthur Holden & Sons Ltd.), MR. T. S. DALLY (Pinchin, Johnson & Associates Ltd.), MR. P. J. GAY (Hangers Paints Ltd.), DR. H. W. KEENAN (Beck, Koller & Co. (England) Ltd.), and MR. S. G. TINSLEY (British Titan Products Co. Ltd.).

LORD MCGOWAN, K.B.E., D.C.L., LL.D., the honorary president of Imperial Chemical Industries Ltd., is leaving for Australia and New Zealand on 8 December by the *Orcadia.* Since he retired as chairman of the company a few years back Lord McGowan has spent considerable time visiting the overseas interests of I.C.I.

DR. F. E. KING, M.A., D.Phil., D.Sc., Ph.D., F.R.S., Sir Jesse Boot Professor of Chemistry in the University of Nottingham, has been appointed a director of British Celanese Ltd. Dr. King will assume a full time appointment with the company as director in charge of research on the termination of his appointment at the university next September.

MR. EDMUND L. HANN, a member of the board for many years, did not seek re-election at the recent annual general meeting of Powell Duffryn Ltd.

MISS K. M. MARKS, B.Sc., A.R.I.C., has been appointed to the newly-created post of chemist to the Mid and South-East Cheshire Water Board. Miss Marks was on the staff of the Liverpool City Analyst until she was appointed to her present post of senior analytical chemist to Severn River Board in 1951.

MR. D. I. BADDELEY, M.A. (Cantab.) has been appointed manager of Orobis Ltd. as from 1 December. Mr. Baddeley was formerly assistant chief chemist in the Lubricating Oil Department of the Anglo-Iranian Oil Company Ltd. Orobis Ltd. is a company jointly owned by the Distillers Company Ltd. and the Oronite Chemical Company of San Francisco, USA, to manufacture in the UK and market the range of Oronite lube oil additives.

Obituary

MAJOR V. F. GLOAG, M.C., M.I.Chem.E., London director of Simon-Carves Ltd., died at his home in Bayswater on 28 November at the age of 65. A former president of the Institution of Chemical Engineers and past chairman of the British Chemical Plant Manufacturers' Association, Major Gloag had 35 years' service with Simon-Carves Ltd., of which he had been a director since 1926. He had been in charge of the chemical plant department from 1920 to 1945, when he took up his London appointment. He had a great many friends in both the chemical and chemical engineering plant industries and he will be especially missed on the Council of the BCPMA.

MR. C. D. ("JIMMY") LAW, B.Sc., Dunlop's chief staff training and appointments officer has died suddenly at the age of 55. A Birmingham man, Mr. Law went to King Edward School and took his B.Sc. at London. He joined Dunlop 35 years ago, and after serving as senior assistant in the research laboratory at Fort Dunlop was appointed assistant to the technical director there in 1930. Two years later he took charge of the product performance division and in 1943 became chief staff training officer.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Receiverships (Appointment or Release)

DEVONSHIRE BARYTA CO. LTD., manufacturers of sulphate of barium, etc., Bridford Mines, Christow, nr. Exeter. Alan C. Shay, of Bilbao House, New Broad Street, E.C.2, ceased to act as Receiver and/or Manager on 5 November, 1954.

Satisfaction

A. BOAKE, ROBERTS & CO. (HOLDING) LTD. (formerly A. Boake, Roberts & Co. Ltd.), London, E. Satisfaction 22 October, £150,000 (inclusive of £100,000 previously reg.), reg. 22 November, 1932.

Changes of Name

The following changes of name have been announced: CHRISTENE PRODUCTS LTD. to WESTED LTD. on 17 September; A. POMFRET'S (ST. ANNES) LTD. to A. POMFRET'S (DRYSALTERS) LTD. on 11 October.

Changes of Address

The London office of SHARPLES PROCESS ENGINEERS LTD. has moved to Brookfield House, 62 Brook Street, W.1.

WILKINSON RUBBER LINATEX LTD. announce that the address of their area engineer in Glasgow, Mr. W. Maitland, has been changed to 66 Woodbank Crescent, Clarkston, Glasgow (Tel: Busby 1819).

New Registrations

Chlivmar Ltd.

Private company. (15,202.) Registered in Dublin. Capital £100. To buy, sell, and distribute all classes of pest eradication chemicals, etc. Directors: Miss Helen M. Marken and Mrs. Sheila Marken.

Maloney Glues & Chemicals Ltd.

Private company. (538,460). Capital £50,000. To acquire the goodwill of the bone and skin processing business carried on by C. E. Maloney and Co. Ltd., etc. The directors are: Alfred A. Boucher, Jean P. Boucher, Chas. E. Maloney and Geo. M. Brown. Secretary: A. G. Burton. Reg. office: Station Road, Gillingham, Dorset.

Concentrated Fruit (London) Ltd.

Private company. (538,493). Capital £15,000. To carry on the business of buyers, sellers, processors, manufacturers of and dealers in products and by-products of fruits and vegetables, and of all chemicals and dyes, connected therewith, etc. The subscribers (each with one share) are: Gustave Roebben and Elaine Roebben. The first directors are not named.

Emulsion Printing Ltd.

Private company. (538,557). Capital £100. To carry on the business of manufacturers of and dealers in pigments, dyes, colours, oils, emulsions and substances of all kinds useful or necessary for the printing or dyeing of textiles, materials, fabrics, etc. The subscribers (each with one share) are: Roger C. M. Nathan and Antony R. Jabez-Smith. The first directors are to be appointed by the subscribers. Industrial and Commercial Finance Corporation Ltd., and T. and W. Farmiloe Ltd. have the right to appoint and remove directors.

Alan Stein Lime Company Ltd.

Private company. (30,322). Registered in Edinburgh. Capital £500. Agricultural and spraying contractors, formulators of and dealers in spray chemicals, etc. The subscribers (each with one share) are: Edward N. Blacklock and Dorothy M. Little. The first directors are not named.

House of Margerison Ltd.

Private company. (539,100). Capital £20,000. Manufacturers of and dealers in soaps and washing materials, oils, greases, perfumes, oleaginous and saponaceous substances, etc. Directors: Wm. D. Margerison and Wm. W. M. Margerison.

Allcleaners Ltd.

Private company. (539,471). Capital £1,000. Manufacturers of and dealers in cleaning materials of all kinds, soap, soap substitutes, etc. The permanent directors are: Allan S. Hall, and John W. Stokes. Reg. office: 91 Crane Street, Salisbury.

Whitehead Chemical Co. (Engineering) Ltd.

Private company. (539,366). Capital £1,000. General, mechanical and electrical engineers, etc. Directors: Arnold Whitehead, Robert Whitehead Hague, John Waldie, and Thomas Tetlow. Reg. office: Holt Mill Road, Waterfoot, Lancs.

Mani-Plastics Production Ltd.

Private company. (540,145). Capital £10,000. Designers and manufacturers of all

kinds of articles, utensils and products capable of being made from plastics, glass fibres, chemicals and allied substances and their ingredients, derivatives and laminations, etc. Directors: Henry E. E. E. Barton, Christopher G. Colclough, Peter J. Garrini and John R. Gillum. Reg. office: 5 Mortgramit Square, Hare Street, Woolwich, S.E.18.

Campbell Brothers (Liverpool) Ltd.

Private company. (539,778). Capital £5,000. Merchants in iron and steel and all metals and scrap and residues thereof, rubber, plastics, timber, chemical products and waste materials, etc. Directors: Thomas V. Anthony, Kenneth A. S. Morrice, Joseph R. Treweek, Fdk. P. Hooley and John J. L. Cognet. Reg. office: 569 Martins Bank Building, Water Street, Liverpool 2.

T. J. Slack & Son Ltd.

Private company. (540,047). Capital £2,000. To acquire the business of a general chemists' merchant and manufacturer carried on by T. J. Slack at 51 Sunderland Street, Macclesfield, Ches. Directors: Thomas J. Slack, Mrs. Florence E. Slack and Dennis Slack. Reg. office: 51 Sunderland Street, Macclesfield.

Nu-Clear De-Misting Co. Ltd.

Private company. (540,087). Capital £100. Manufacturers, preparers, treaters, developers of and dealers in chemical and other processes and in viscose and other sheets, skins, films, tissues, substances and solutions to be applied to glass, fabrics and other materials, etc. The subscribers (each with one share) are: Richard M. Lucas and Margaret E. Baker. The first directors are to be appointed by the subscribers.

F. H. Clark & Son (Southend Chemicals) Ltd.

Private company. (540,241). Capital £100. Manufacturers of and dealers in chemicals, gases, disinfectants, dyes, printing ink, pigments, acids, drugs, powders, medicines, lime, manures, fertilisers, etc. Directors: Frank H. Clark and Frank N. Clark. Reg. office: 'Magenta,' Keith Way, Southend on Sea.

Industrial Suppliers (Wimborne) Ltd.

Private company. (540,193). Capital £100. Manufacturers of and dealers in chemicals, gases, drugs, medicines, etc. The permanent directors are: Geo. H. Osborn and Arthur Hughes. Reg. office: Sussex Chambers, 8/10 Havelock Road, Hastings.

Marnick Ltd.

Private company. (539,658). Capital £100. Chemical, oil fuel, marine and consulting engineers. Directors: Nicholas L. Anfilogoff and Marjorie Anfilogoff. Reg. office: Callard House, Regent Street, W.1.

Company News

Aspro Ltd.

An interim dividend on the £1,000,000 ordinary capital, payable on 31 December, has been declared by the directors of Aspro Ltd. The interim payment last year was 17½ per cent on the £500,000 capital, and the present dividend represents an effective increase of 1¼ per cent.

British Celanese Ltd.

British Celanese Ltd. are paying an interim dividend of 3 per cent, less tax, on the £7,518,534 ordinary capital, as increased by a one-for-one scrip issue for the year ending 2 April 1955. This is equal to the 6 per cent interim dividend for 1953-54.

Oxley Engineering Co. Ltd.

Speaking at the annual general meeting of the Oxley Engineering Co. Ltd. on 25 November, the chairman, Mr. H. Saville, said a reasonable offer had been received for A. and W. H. Bury (Darwen) Ltd., which the directors had decided to accept. The parent company, he said, was in full production and the order book was in a very healthy position. The 17½ per cent dividend (THE CHEMICAL AGE, 1954, **71**, 952) was approved.

Powell Duffryn Ltd.

Powell Duffryn Ltd. announce a dividend of 2¾ per cent actual, less income tax at 9s. in the £, on the £3,600,000 4¾ cumulative preference stock for the six months ending 31 December, 1954. Payment is to be made on 1 January 1955, to holders registered on the books of the company at close of business on 1 December, 1954.

Unilever Ltd.

Shareholders of Unilever Ltd. adopted on 29 November the proposal to make a one-for-four free scrip issue in ordinary shares (THE CHEMICAL AGE, 1954, **71**, 1006). A similar issue by Unilever NV was approved in Amsterdam earlier in the month. The two companies have now declared their proposed interim dividends of the equivalent of 6 per cent (Unilever Ltd.) and 5¼ per cent (Unilever NV) on the increased capital.

Next Week's Events

MONDAY 6 DECEMBER

Royal Institute of Chemistry

London: University College, Chemistry Lecture Theatre, University College, Gower Street, W.C.1, 6.30 p.m. 'The Value of Work Study to the Chemical Industry' by J. Grange Moore (with London Section and Chemical Engineering Group, SCI).

Society of Chemical Industry

Leeds: Chemistry Lecture Theatre, The University, 7 p.m. 'Dust Explosions in Factories' by Dr. D. Matheson.

TUESDAY 7 DECEMBER

Society of Chemical Industry

London: Chemical Society's Rooms, Burlington House, Piccadilly, 6.30 p.m. Plastics and Polymer Group. 'The Structure and Properties of Polymers' by Professor J. Flory.

Institute of Metals

Oxford: Cadena Café Ballroom, Cornmarket Street, 7 p.m. Junior Members' Evening.

Swansea: Metallurgy Department, University College, Singleton Park, 6.45 p.m. 'Peacetime Uses of Atomic Energy' by Dr. Alex B. McIntosh.

Institute of Metal Finishing

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. 'The Protective Qualities of Phosphate Coatings on Steel' by Dr. S. G. Clarke.

Royal Statistical Society

Liverpool: Royal Institution, Colquitt Street 1, 7 p.m. 'Non-parametric Tests' by Professor G. A. Barnard.

Glasgow: The Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, C.2, 7.30 p.m. 'The Use of Graphical Statistics in Steelmaking' by Douglas Hadfield.

WEDNESDAY 8 DECEMBER

Chemical Society

Dublin: Chemistry Department, University College, 7.45 p.m. 'Paul Ehrlich 1854-1915' by Dr. J. G. Belton.

Society of Chemical Industry

London: Chemical Society's Rooms, Burlington House, Piccadilly, 6.30 p.m. Food Group (Nutrition Panel). 'The Nutritive Value of Beer' by Dr. E. C. Barton-Wright.

Midlands Society for Analytical Chemistry

Birmingham: Mason Theatre, The University, Edmund Street, 6.30 p.m. Discussion on 'The Analytical Chemistry of Aluminium and its Alloys.'

Institute of Fuel

Manchester: Engineers' Club, Albert Square, 10 a.m. Special study of sulphur removal and recovery from fuel—Papers 1, 3, 4, 12 and 13.

Liverpool: Liverpool Engineering Society's Rooms, 9 The Temple, Dale Street, 6 p.m. Brains Trust. Sir Oliver Lyle, Professor W. J. Kearton and Dr. W. A. Macfarlane; chairman, H. Macdonald Steward (joint meeting with Liverpool Engineering Society).

Leeds: Hotel Metropole, 2.30 p.m. 'Shell- and Water-tube Boiler Maintenance and Repair' by A. Jeavons.

Manchester Metallurgical Society

Manchester: Lecture Room, Central Library, 6.30 p.m. General discussion on mechanical testing.

Royal Statistical Society

London: ELMA Lighting Service Bureau, 2 Savoy Hill, W.C.2, 6 p.m. 'The Latest Techniques in Experimental Design' by Dr. D. J. Finney.

THURSDAY 9 DECEMBER

Royal Society

London: Burlington House, Piccadilly, 4.30 p.m. 'Irradiation of Explosives with High Speed Particles and the Influence of Crystal Size on Explosion' by F. P. Bowden and K. Singh and 'The Area of Real Contact and the Shear Strength of Monomolecular Layers of a Boundary Lubricant' by Miss A. I. Bailey and J. S. Courtney-Pratt.

Chemical Society

Edinburgh: North British Station Hotel, 7.30 p.m. 'Recent Researches in Crystallography' by Professor Kathleen Lonsdale (joint meeting with RIC and SCI).

Hull: Chemistry Department, The University, 7.30 p.m. 'Chemotherapy and Essential Trace Elements' by Professor Adrian Albert (joint meeting with RIC).

Society of Chemical Industry

London: Large Hall of the Medical Society of London, 11 Chandos Street, Caven-

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dish Square, W.1, 6.15 p.m. Microbiology Group. 'Industrial Uses of Enzymes' by Dr. G. H. Green, F. L. Barrett, Dr. E. A. Stubbs and Dr. A. J. Amos.

Institute of Fuel

London: Institution of Civil Engineers, Great George Street, S.W.1, 5.30 p.m. 'Note on the "Optimum Degree" of Coal Washing' by J. K. Matthews.

Textile Institute

Manchester: 10 Blackfriars Street, 7 p.m. 'Relations of the Dyer to other Sections of the Textile Industry' by G. H. Heap.

FRIDAY 10 DECEMBER

Royal Institution

London: 21 Albemarle Street, W.1, 9 p.m. 'Coal and Smokeless Fuels' by Sir Charles Ellis.

Royal Institute of Chemistry

Maidenhead: Courtaulds' Research Laboratories, 2.30 p.m. Visit by London Section, followed at 6.30 p.m. by two lectures on 'Some Aspects of Polymerisation' by Dr. A. D. Jenkins and Dr. C. H. Bamford.

Society of Chemical Industry

London: Chemistry Lecture Theatre, King's College, Strand, W.C.2, 7 p.m. Fine Chemicals Group. Reading of original papers by members.

Institution of Chemical Engineers

London: Caxton Hall, S.W.1, 6.30 p.m. Graduates and Students Section. 'The Training of the Chemical Engineer' by Professor F. Morton.

Society for Analytical Chemistry

London: Meeting Room of the Chemical Society, Burlington House, Piccadilly, 6.15 p.m. Annual general meeting of Biological Methods Group, followed by an ordinary meeting.

Institute of Metal Finishing

Sheffield: Grand Hotel, 6.30 p.m. Open evening discussion, C. Wharrad in the chair.

Oil & Colour Chemists' Association

Manchester: Engineers' Club, Albert Square, 6.30 p.m. Discussion evening with the Federation of Master Painters and other bodies.

SATURDAY 11 DECEMBER

Institution of Chemical Engineers

Birmingham: The University, Edmund Street, 3 p.m. 'Synthetic Acetic Acid' by R. Page.

Manchester: College of Technology, 3 p.m. 'Vapour and Gas Evolution from Low-Vapour Pressure Liquids' by G. Burrows and F. H. Preece.

Market Reports

LONDON.—There has been little change if any, on the industrial chemicals markets either as regards conditions or prices. A good movement against contracts has been reported and there has been a fair volume of new inquiry. Export demand continues to be satisfactory with the Commonwealth countries providing the chief outlets. The figures relating to October shipments of chemicals recently published were well up to the average for the earlier months of the year and it would seem from this that the dock strike had less effect than was supposed at the time. The only price change that has been notified is a reduction in the lead compounds as from 25 November. The basis price for dry white lead is now £139 5s. per ton and dry red lead £134 5s. per ton with litharge at £136 5s. per ton. Firm conditions continue to prevail in the coal tar products market and a good demand has been experienced for pitch and creosote oil.

MANCHESTER.—Few price changes of any consequence have occurred on the Manchester market for heavy chemical products during the past week and the undertone generally remains firm. With odd exceptions home trade demand from the consuming industries in the Lancashire area has been well maintained and steady contract deliveries are being taken, while new bookings during the week have been on a fair scale. Additional inquiries from shippers in the bread-and-butter lines have also been reported. A moderate weight of fresh business has been put through in the fertiliser section. Creosote oil and most other heavy by-products are in steady request, as are also the light distillates.

GLASGOW.—The past week, according to reports from a number of sections of the trade, has been one of the busiest for many months. Prices on the whole have been firm with a slight easing in copper derivatives. Difficulty is still being experienced with deliveries but the position has improved and it is to be hoped that conditions will soon be back to normal. There is little change in the satisfactory export position.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

A. BOAKE, ROBERTS & CO., LTD., LONDON, E.15, require **SENIOR CHEMISTS** for their Process Development Department. These appointments would appeal to qualified men with some years of experience of Organic Chemistry, seeking the opportunity to lead a team in developing new projects from laboratory to plant scale, so as to provide new or improved products. The minimum salary envisaged is £800 per annum.

The Company also requires **ASSISTANT CHEMISTS** to participate in these projects. Industrial Chemical experience is desirable in these appointments. Minimum salary is £550 per annum. Applications in detail to **PERSONNEL MANAGER.**

A. BOAKE, ROBERTS & CO., LTD., CARPENTERS ROAD, LONDON, E.15, require the services of **SHIFT CHEMISTS** for Plant Control work. Academic qualifications will be an advantage, but are less essential than industrial plant experience. The work is interesting and varied, and the appointments will be progressive. There is every opportunity for advancement. Initial salary will be in the range of £600 to £700 per annum.

Applications plainly marked "Shift Chemists," to **PERSONNEL MANAGER.**

APPLICATIONS are invited by **MUFULIRA COPPER MINES, LIMITED, NORTHERN RHODESIA,** for a post as **GENERAL FOREMAN** in furnace and casting section of electrolytic refinery. Successful candidate will be required to commence work early in 1955. Applicants must have expert knowledge of casting copper wirebars, cakes and billets, together with long experience in position of responsibility connected with furnace refining of copper. Commencing basic salary, £1,296 per annum, plus copper bonus at present 60 per cent on basic salary, and cost-of-living allowance currently £66 per annum. Free outward passage. Leave at 51 days per annum may be accumulated over three years. Write **MINE EMPLOYMENT DEPARTMENT, SELECTION TRUST BUILDING, MASON'S AVENUE, COLEMAN STREET, LONDON, E.C.2.**

PHYSICAL CHEMIST (or Physicist, with knowledge of Analytical methods) for production/development work on Fine Powders at Works near St. Albans, Herts. Excellent prospects, Pension Fund. Profits Sharing Scheme. Write full details age, qualifications, experience to date, Salary required to **STAFF MANAGER (REF. M.), F.W. BERK & CO. LTD., HEAVY CHEMICAL MANUFACTURERS, P.O. BOX 193, 1-19 NEW OXFORD STREET, LONDON, W.C.1.**

LABORATORY ASSISTANT, 20-23, required by Horace Cory & Co., Ltd., Colour Manufacturers, Hatcham Manor Works, London, S.E.15. Write to Works Manager, giving details of education and experience.

CHEMICAL ENGINEER. A first-class man, fully experienced in plant management is required by a leading company in the North-West area.

The successful applicant must have experience of plant design and maintenance, be a good disciplinarian and possess energy, initiative and tact. A knowledge of electrolytic deposition would be an advantage.

Good salary and prospects. Contributory Pension Scheme.

Apply, giving full details of education and experience, age, etc., to **BOX No. C.A. 3372, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

BRITISH ENKA, LTD., RAYON YARN PRODUCERS, REQUIRE A NUMBER OF SCIENTISTS AND TECHNOLOGISTS OF THE FOLLOWING TYPES TO FILL PERMANENT AND PROGRESSIVE POSITIONS.

CHEMISTS
Honours Graduate or A.R.I.C., with experience in the Chemical or Textile Industry or in research connected with either.

CHEMICAL ENGINEERS
A.M.I.Chem.E., or equivalent, with experience of the design and operation of chemical plant. Graduates of the Institution with suitable experience will be considered.

PHYSICISTS
Honours Graduate with industrial or research experience, preferably connected with the Textile Industry.

PHYSICAL CHEMISTS
Honours Graduate, preferably with research experience in cellulose or related fields.

TEXTILE TECHNOLOGISTS
University Graduate or equivalent, with experience in any branch of Textile Industry or research.

Interesting work in modern laboratories, good salaries, pension scheme, 5-day week, canteen and sports and social facilities. Applications, giving details of age, qualifications and experience, which will be treated in confidence, should be addressed to Personnel Manager:

BRITISH ENKA, LTD., AINTREE, LIVERPOOL, 9.

SENIOR man wanted for Analysis of General Inorganic Chemicals. Age 24-30. Higher National or A.R.I.C. standard. Unusually varied and interesting work under excellent conditions. Pension Scheme. Apply, stating age, experience and salary required, to **FOUNDRY SERVICES, LIMITED, LONG ACRE, BIRMINGHAM, 7.**

CHEMICAL ENGINEER required at Ministry of Supply Establishment to be concerned with development of chemical processes, involving semi-technical research and design and operation of pilot units. Minimum age, 26. Qualifications: 1st or 2nd Class Honours Degree (Chemical Engineering) or equivalent, with post-graduate experience in development work including design of pilot units. Appointment in grade of Senior Scientific Officer located in S.W. England, where a house may be available shortly for selected candidate, if married. Salary within range £935-£1,090. F.S.S.U. benefits may be available. Application forms from **M.L.N.S., TECHNICAL & SCIENTIFIC REGISTER (K), 26, KING STREET, LONDON, S.W.1,** quoting F806/54A. Closing date, December 31, 1954.

SITUATIONS VACANT

PROCESS ENGINEER. Cabot Carbon, Limited invite applications for the post of Process Engineer to supervise the technical control of plant operations and improvements. Candidates should possess a sound degree in Chemical Engineering, Physics or Chemistry, together with not less than three years' experience in connection with plant operation in the chemical or petroleum refinery industry.

The company is expanding rapidly and good opportunities for progress exist for those possessing initiative and a willingness to accept responsibility.

As this is a senior appointment the salary offered will be commensurate with experience and qualifications.

Applications should be addressed to **THE WORKS MANAGER, CABOT CARBON, LIMITED, STANLOW, ELLESMERE PORT.**

THE STIRLINGSHIRE AND FALKIRK WATER BOARD has a vacancy for a **CHEMIST, BACTERIOLOGIST AND FILTRATION SUPERINTENDENT,** whose duties will involve the control of water treatment.

Applications will be accepted from experienced industrial chemists who have gained the Senior National Certificate, or equivalent, and who have also gained or are studying for the A.R.I.C. Some initial experience of water analyses is desirable and Bacteriology should have been included in study subjects. An interest in, or knowledge of, biology would be an additional advantage.

The post offers ample scope for study and research by an energetic technician. The person appointed will be required to stay at the site of one of the filtration plants where a **MODERN BUNGALOW WILL BE SUPPLIED, RENT FREE.** The salary offered will lie within three N.J.I.C. Scales, with a minimum of £630 per annum and a maximum of £770 per annum, depending on qualifications and experience. An applicant in the upper scale would commence at £705, rising by three annual increments to the maximum of £770.

The appointment will be subject to the Board's Conditions of Service and to entry into the Superannuation Scheme for which the successful candidate will be required to pass a medical examination.

Applications, together with the names of referees, must be lodged with **MR. ERIC W. DENHOLM, M.I.C.E., WATER BOARD OFFICES, "BROCKVILLE," FALKIRK,** not later than December 9, 1954.

FOR SALE

COCHRAN No. 10 Vertical Watertube **STEAM BOILER**—1,620 lb. evap. No. 5 Ditto, 750 lb. evap. Both 100 lb. pressure. 3 in. gilled steel steam tubing. **KIMMINS & SONS, LTD., LYNDHURST ROAD, WORTHING.**

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE: 3285 EAST.**

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